Guam Coastal Management Program
Bureau of Statistics and Plans
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DRAFT

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List of Acronyms

A&S	Assessment & Strategy
APC	Area of Particular Concern
BSP	Guam Bureau of Statistics and Plans
BMPs	Best Management Practices
CMP	Coastal Management Program
CRI	Coral Reef Initiative
CRM	Coastal Resources Management
CSI	Cumulative and Secondary Impacts
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DoAg	Guam Department of Agriculture
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	Geographic Information System
GMSL	Global Mean Sea Level
GCMP	Guam Coastal Management Program
GEPA	Guam Environmental Protection Agency
GHMP	Guam Hazard Mitigation Plan
GHPO	Guam Historic Preservation Office
GPWA	Guam Power and Water Authority
GVB	Guam Visitor's Bureau
LID	Low impact development
MPA	Marine Protected Area
NPA	National Park Service
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetlands Inventory
NGLA	Northern Guam Lens Aquifer
OCM	Office of Coastal Management (NOAA)
SAMP	Special Area Management Plan
SLR	Sea Level Rise
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Services
UoG	University of Guam
UXO	Unexploded Ordnance
WERI	Water and Environmental Research Institute
WQS	Water Quality Standard

I. Introduction

Section 309 of the Coastal Zone Management Act (CZMA), as amended, encourages states and territories to develop program changes in one or more of nine coastal zone enhancement areas through a grant program. Rather than just changes to the manner that states and territories implement programs, the changes are made to federally approved CZM programs. These changes may include updates or revisions to state and territory enforceable policies and authorities. Such changes include the following activities that will enhance a state or territory's ability to achieve one or more of the coastal zone enhancement objectives:

1. A change to coastal zone boundaries;
2. New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/ understanding;
3. New or revised local coastal programs and implementing ordinances;
4. New or revised coastal land acquisition, management, and restoration programs;
5. New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
6. New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

Every five years, states and territories are encouraged to conduct self-assessments of their coastal management programs to determine problems and enhancement opportunities within each of the nine enhancement areas—and to assess the effectiveness of existing management efforts to address identified problems. Each coastal management program identifies high-priority management issues, as well as important needs and information gaps the program must fill to address these issues.

Following this self-assessment, NOAA's Office for Coastal Management (OCM), works closely with each coastal management program to further identify the high-priority needs for improvement within one or more of the nine areas. The coastal management program then develops strategies, consulting with OCM, to improve its operations to address these management needs. The strategies provide a stepwise approach to reach a stated goal and lead to enhancement in the state's or territory's federally approved coastal management program. OCM reviews and approves the Section 309 "assessment and strategy" document for each state and territory and, after approval, provides funding under Section 309 to help them carry out those strategies. The following document provides a description of each enhancement area, the level of priority of the enhancement area, and any significant changes. A "phase 1" general overview is provided for each enhancement area and "phase 2" in depth-assessments are included for enhancement areas identified as "high priority" in this planning cycle. The table on the next page shows changes in priority levels in red text and highlights that three enhancement areas – coastal hazards, cumulative and secondary impacts, and special area management plans – were identified as high priorities for this report, which is updated as of 2020 to guide the next five-year planning cycle.

Following initial surveys and the self-assessment, GCMP worked closely with the Office for Coastal Management (OCM), under the National Oceanic and Atmospheric Administration (NOAA), to further identify the high-priority needs for improvement within one or more of the nine areas. The GCMP then developed strategies, consulting with OCM, to improve its operations to address these management needs. The strategies outlined here aim to provide a realistic and achievable approach to reach a stated goal and lead to enhancement in the coastal management program.

This document represents the Section 309 A&S Report for the Bureau of Statistics and Plans' Guam Coastal Management Program. This 309 A&S was developed based on research on existing programs with input from a wide variety of stakeholders, both public and private, however, due to COVID-19 social distancing requirements, these meetings and communications were held using digital platforms. The Section 309 A&S process places emphasis on engagement from stakeholders and the public. As part of this process, stakeholder agencies and non-governmental organizations were invited to complete an online survey in which participants were asked to rank the nine enhancement areas and describe the priority areas of concern or need. The public was again asked to provide feedback on a final draft of this document during a 30-day comment period on November 12, 2020. The draft document was made available for review on BSP's website, and the public was notified of the comment period via BSP's social media accounts.

Based upon initial stakeholder feedback and follow-up surveys combined with an internal assessment of each enhancement area's resource characterization, GCMP's management characterization, and current or projected threats to each enhancement area, BSP-GCMP identified three "High-Level" priorities from the list of nine areas: Coastal Hazards, Cumulative and Secondary Impacts, and Special Area Management Planning. Two strategies were developed to address cross-cutting needs to support implementation of BSP-GCMP management authorities through the codification of conservation planning elements and critical implementation support tools to support these high priority enhancement areas.

Enhancement Category	**2015 Rating**	**2020 Rating**
Wetlands	Medium	Medium
Coastal Hazards	Medium	High
Public Access	High	Medium
Marine Debris	Low	Medium
Cumulative & Secondary Impacts	High	High
Special Area Management Plans	High	High
Ocean Resources	Medium	Medium
Energy & Government Facility Siting	Low	Medium
Aquaculture	Low	Medium

II. Summary of Recent Section 309 Achievements

2011-2015 Section 309 Achievements

Between 2016-2020, GCMP was able to finalize several program changes resulting from strategies resulting from the previous 2011-2015 Section 309 Assessment & Strategy Report. These updates and program changes are discussed below.

Development of a Cumulative and Secondary Impact GIS Tool for Guam - NA11NOS4190115

Enhancement Area: Cumulative & Secondary Impacts

The Geographic Information Systems (GIS) Screening Tool was developed in collaboration with the University of Guam's Water and Environmental Research Institute (UoG-WERI). The report, *GIS-Based Screening for Cumulative and Secondary Impacts from Development Projects in Northern Guam*, (Muller et al.) was published in 2013. It details that the project resulted in the (1) development of the Northern Guam Geodatabase, (2) creation of an Affected Areas Tool, and (3) quantification of effects from different development scenarios for Northern Guam.[1]

The Northern Guam Geodatabase developed in this project contains 29 feature datasets and 5 raster datasets portraying geographic information about Northern Guam. The Affected Areas Tool is a GIS-based tool that utilizes inputs from the Northern Guam Geodatabase to screen the resources that may be affected by future developments. For determination of CSIs, a benefit of GIS datasets is that they can be used to inventory, evaluate, and predict future environmental changes. The outcome of the land development scenarios considered here indicates that for Northern Guam, undeveloped lands will be converted to urban/built-up areas with forested areas being affected the most. The datasets that were produced through this effort are available in the North Guam Viewer.[2]

The 2013 report indicated that Cumulative and Secondary Impacts (CSIs) of concern include stormwater runoff, loss of habitat, water quality degradation, and associated potential contamination problems. These CSIs can be induced by development-related activities such as increased development, loss of large vegetation tracts, and increased impermeable surfaces. The 2013 WERI report notes that the "Northern Guam Geodatabase coupled with the Affected Areas Tool can be used as a screening method to simultaneously assess potential CSIs from multiple projects" and recommends that the geodatabase should be updated if new layers or updates are made available. It also notes that further research will be needed to model the routes that contaminants originating from developments take to reach the aquifer or coastal areas, which may be especially critical to protecting the groundwater in Northern Guam.

The Northern Guam Geodatabase and Assessment Tool 309-supported project has produced a comprehensive data set that can support screening for potential CSIs in Northern Guam. The Affected Areas Tool utilizes inputs from the Northern Guam Geodatabase to show how much of a resource would

[1] L. Muller, J.D. Rouse, & S.hahram Khosrowpanah, P.E., *GIS-Based Screening for Cumulative and Secondary Impacts from Development Projects in Northern Guam*, 2013, University of Guam Water and Environmental Research Institute, Technical Report 146, available at https://guamhydrologicsurvey.uog.edu/Library/PDFs/WERI%20TR%20146-%20Muller%20et%20al%202013.pdf.
[2] Digital Atlas of Northern Guam, UoG-WERI, available at http://north.hydroguam.net/index.php.

be potentially affected by a proposed development. The Affected Areas Tool was adapted from a previously developed ESRI analysis tool that assesses impacts of roads on vegetation. To use the tool, users must have working knowledge of ArcGIS, a proprietary suite of GIS software products which includes mapping and analytics platform from ESRI. However, due to staff turnover, no trainings have been held on how to use the existing database, and much of the compiled geospatial information is now over a decade old. BSP-GCMP is currently working with the National Fish and Wildlife Foundation (NFWF) and the National Environmental Modeling and Analysis Center to compile existing layers into the Coastal Resilience Evaluation and Siting Tool (CREST) which will support a more user-friendly interactive mapping and reporting tool, hosted online by NFWF, to further support these scoping efforts as well as inform next steps in policy development.

Public Access for Natural and Cultural Resources - NA12NOS4190167

Enhancement Area: Public Access

The project focused on conducting and complete a survey to determine the public's attitudes about the state of public access for natural and cultural resources on Guam. A presentation on this assessment was given at the 2020 Assembly of Planners. The report has been finalized and is currently being used as the basis to inform the development of the Public Access Management Plan. The report reflects qualitative and quantitate investigations of attitudes and behaviors relevant to coastal access, provides a detailed inventory and analysis of policies, statutes, regulations, and programs affecting public access, and provides a series of recommendations designed to improve Guam's coastal access program and increase public engagement regarding this effort. Next steps include completing the Public Access Management Plan and incorporating this data and the Public Access Report recommendations into the Seashore Reserve Master Plan update which is discussed further in the following 2015-2020 Section 309 Achievements section.

Tsunami Study – NA13NOS4190132

Enhancement Area: Coastal Hazards

The project focused on supporting incorporation of data from NOAA's Pacific Marine Environmental Laboratory's 2010 Tsunami Hazard Assessment (THA) for Guam into updated plans and policy guidance. The 2010 THA reported results of tsunami hazard assessments for each of five coastal communities on the Island of Guam—Tumon Bay, Agana Bay, Pago Bay, Apra Harbor, and Inarajan Bay—using both moderate (Mw 8.5) and Great Earthquake (Mw ≥ 9.0) scenarios. Wave amplitudes as high as 7.0 m at Tumon Bay were predicted, and at Pago and Inarajan bays the leading wave was predicted to arrive within 20 min with amplitudes as high as 15 m and 9 m, respectively, following a Great or worst-case earthquake. This data was further considered and incorporated into subsequent 2014 and 2019 updates of Guam's Hazard Mitigation Plan through Guam Homeland Security Office of Civil Defense (HS/CD).

Updated data that has been developed this reporting period includes a one-dimensional wave run-up model for Coastal Hazards (Storlazzi et al., *Rigorously Valuing the Role of U.S. Coral Reefs in Coastal Hazard Risk Reduction*, 2019). Stakeholders report that the NOAA SLOSH (Sea Lake and Overland Surge from Hurricanes) model for Guam is expected to be released late in 2020. New Lidar and topobathy map being requisitioned by NRCS and are also scheduled to be released by the end of 2020.

2015-2020 Section 309 Achievements

GCMP's 2015-2020 Section 309 Assessment and Strategy resulted in two strategies:

Task 1: "Cumulative and Secondary Impact in the Development Review and Permitting Process"; and

Task 2: "Public Access Strategy" focusing on the development of a comprehensive Public Access Management Plan (PAMP).

Despite staff turn-over and project delays due to storms and the COVD-19 pandemic, numerous 309 objectives and activity goals were accomplished over this reporting period, which are detailed further in the accomplishment summaries below.

GCMP Development Guidebook Update - NA17NOS4190202

Enhancement Area: Cumulative and Secondary Impacts

This task focused on engaging with Guam regulatory and network agencies to re-assess and update development standards. These efforts, which included stakeholder meetings and interviews, culminated in the 2020 update of the 2005 Guam Developers Guidebook. The updated included revised programmatic and contact information including hyperlinks to websites and forms where available, and a "developers' matrix" aimed at ensuring cross-cutting regulatory coordination needs were identified early in the project scoping process to support the goal of achieving more compliant and environmentally sustainable development practices. Although compliance with the 2006 stormwater management requirements was emphasized in the guidebook update, many stakeholders agreed that increased interagency coordination was needed to support goals to reduce imparts of stormwater. Ongoing stormwater management and flood risk reduction planning efforts are underway with BSP-GCMP, GEPA, DPW, and other local and federal partners including USACE, USEPA, and FEMA.

BSP Assessment and Effectiveness Report and Recommendations - NA17NOS4190202

Enhancement Area: Cumulative and Secondary Impacts

This task focused on producing an assessment of the effectiveness of planning and regulatory controls concerning development and natural resource protection. The assessment and recommendations report was completed and delivered. The contents of this report are being applied to support strategy scoping for this current 309 planning update and will inform annual 306 proposal development.

CSI Assessment and Policy Guidance - NA18NOS4190202

Enhancement Area: Cumulative and Secondary Impacts

In collaboration with the University of Guam (UoG), this task is supporting the evaluation of cumulative and secondary impacts to two critical watersheds and supporting the creation of a user-friendly decision support tool to assist developers and permitting agencies with standardizing their assessments of CSI related to stormwater. The task is still in progress but key project milestones including executing the memorandum of understanding (MOU) for support services and certification of scope of work have been achieved in this reporting period. These efforts will support data development and policy revisions

specific to stormwater management best practices for Guam. Policy guidance continues to be in development in partnership with UoG and is anticipated by September, 2021.

Public Access for Natural and Cultural Resources - NA16NOS4190187

Enhancement Area: Public Access

In 2019, Market Research & Development, Inc. (MR&D) completed the development of surveys and engaged stakeholders to gain their perspectives on public access. Stakeholders comprised both public and private sector groups. Based on stakeholder interviews, a quantitative resident survey, and qualitative document review and field observations the study confirms that public shoreline access is an important coastal resource for Guam. While Guam has numerous public access points including beach parks and trails, there is no single consolidated source of information about where and what these access resources may be, how accessible they are to the general public, or the type of amenities (e.g. restrooms, water, parking) that may be found at each point. The study also found that Guam has a strong foundation for protecting and providing public access for its residents and visitors; however, public access could be improved. The study found that public access can be improved by the following recommendations, which could also improve staff capacity, leverage resources, respond to future growth and environmental change, and promote stewardship of public access. The twelve recommendations are listed below:

- Complete an Updated Inventory of Public Access Resources;
- Provide the Shoreline Access Inventory to the Public through website and cellular phone applications;
- Complete a Public Access Management Plan;
- Establish an "Access Program" and "Coordinator/Manager" position in BSP/GCMP;
- Update Development Application materials and Review Checklists with Specific Access Requirements and Findings;
- Establish a Public Access Enforcement Task Force;
- Implement a Comprehensive Public Access Signage Program;
- Address Public Access Parking Supply and Demand/Transportation;
- Conduct a Sea Level Rise Vulnerability Assessment of Coastal Access Resources;
- Seek additional funding to support new Public Access Program activities;
- Leverage Coastal Clean-up Day Activities to Increase Support for Shoreline Access-way Management and Maintenance; Build Public Awareness;
- Develop Public Access Brochure/Online Materials address Public Access Rights.

Building off of the completed Public Access Assessment, the GCMP continues to support the development of a management plan for public access as well as supporting community education and outreach materials. The importance of this 309 planning project has been highlighted by recent public access restrictions and establishment of a new "surface danger zone" which have increased coastal user conflicts. Through its planning authority, GCMP is continuing to work with its partner agencies to proposed and adopt a Seashore Reserve Plan which will be the legal and enforceable mechanism to protecting public access, minimize user conflicts, and work toward the long-term management of Guam's marine and nearshore resources. The Seashore Reserve Plan was anticipated to be completed through support of 306 funding by March 2021. However, due to the ongoing GovGuam shutdown in response to COVID-19, progress has been slowed and a No Cost Extension request may be necessary to extend the performance period of these efforts.

III. Assessment

Phase I (High-Level) Assessment

Wetlands

Section 309 Enhancement Objective: Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands. §309(a)(1)

> *Note: For the purposes of the Wetlands Assessment, wetlands are "those areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." [33 CFR 328.3(b)].*

Resource Characterization:

1. Using provided reports from NOAA's Land Cover Atlas, please indicate the extent, status, and trends of wetlands in the state's coastal counties.

Current state of wetlands in 2016 (square miles): 6.315 square miles (according to 2016 C-CAP data).

Coastal Wetlands Status and Trends

Change in Wetlands	from 2005-2016*
Percent net change in total wetlands (% gained or lost)	+0.033 m^2 +0.37%
Percent net change in freshwater (palustrine wetlands) (% gained or lost)	+0.0218 m^2 0.32%
Percent net change in saltwater (estuarine) wetlands (% gained or lost)	+0.0117 m^2 +1.49%
*Compares C-CAP data available from 2005 to 2016 with thanks to NOAA-OCM. There appears to be some disagreement in C-CAP totals and other wetland reports. Additional ground-truthing and analysis is recommended to confirm baseline information and support future trends analysis.	

How Wetlands Are Changing

Land Cover Type	Area of Wetlands Transformed to Another Type of Land Cover between 2005-2016 (Square Miles)*
Development	0 square miles of wetland converted to development but 12 square miles or 5.7% increase in overall IC reported; see CSI for further discussion
Agriculture	0.01
Barren Land	0.01
Open Water	0.01
*Compares C-CAP data available from 2005 to 2016 with thanks to NOAA-OCM. There appears to be some disagreement in C-CAP totals and other wetland reports. Additional ground-truthing and analysis is recommended to confirm baseline information and support future trends analysis.	

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of coastal wetlands since the last assessment to augment the national data sets.

Based on comparison with other datasets such as the US Fish and Wildlife Service (US FWS) National Wetlands Inventory (NWI), the C-CAP data may underestimate wetland extent and therefore wetland loss. Discrepancies in C-CAP data, NWI assessment, and actual wetland area are highlighted by GEPA's 2018 Integrated Water Quality Report (IR) which indicates a total of 1,962 acres or approximately 3 square miles of monitored wetlands under the 305(d) listing. This calculation reflects a variance from C-CAP data that indicates closer to 6 square miles of wetlands. While this variation may be explained by different delineations of "open water" systems, it appears that the majority of these areas are estimated and not verified by ground-truthed analysis.

The 1991 Wetland Guidebook highlights that "Guam's definition differs from the official federal definition in that the wording used on Guam includes references to aquatic life and specifically includes pond, surface springs, and by reference, many marine based wetlands." This definition remains current today (see 18 Guam Administrative Rules and Regulations (GAR), Chapter 3 – Territorial Planning Commission, Article 5 Wetland Areas §3504). Wetlands continue to be regulated as an "area of particular concern" which require the submission of an environmental impact assessment and approval of a "wetland permit" by the Territorial Planning Commission before development may occur. In 1996, Executive Order Number 96-26 created the Application Review Committee (ARC) to replace the Development Review Committee, and to streamline the review process for the Territorial Land Use Commission/Territorial Seashore Protection Commission/Guam Natural Resources Board – therefore today, the ARC reviews and issues permits for wetland development at the territorial level.

As discussed further below, the 2018 IR indicates that Guam has 116.5 miles of shoreline, 14.2 square miles of coral reefs, 0.55 square miles of seagrass beds, 1.43 square miles of estuarine systems, and 21.73 square miles of marine bays. Excerpts from the CWA 303(d) and 305(b) water quality report are included below for further discussion of wetland trends as they relate to water quality in "marine waters" and "fresh waters" to provide additional details about water quality in palustrine and estuarine as well as riverine wetland systems. Based on this analysis, there are approximately 1,962 acres 305(b) listed wetlands as well as 915 acres or 1.43 square miles estuarine systems and 13,907 acres or 21.73 square miles of marine bays.

Reports completed since the last assessment:

Guam Erosion and Sediment Control Field Guide Update, 2017: GCMP led the development of the Guam Erosion and Sediment Control Field Guide in 2012. This guide was designed specifically for contractors in Guam involved in clearing, grading, stockpiling, and other earth-moving activities at all construction sites. Its requirements are administered and enforced pursuant to the Guam's National Pollution Discharge Elimination System (NPDES) permit requirements; Water Quality Standards; and Soil Erosion and Sediment Control Regulations (22GAR-2 Chapter 10). In 2015 Guam EPA initiated revisions of the Water Quality Standards which were adopted and went into effect March 7, 2018. In

2017, GEPA updated this Field Guide to provide additional guidance to ensure compliance with updated stormwater management requirements for construction site development. [3]

Guam EPA 303(d) and 305(b) Integrated Water Quality Report (Integrated Report), 2018: The Integrated Report (IR) from Guam's Environmental Protection Agency (GEPA) provides updates every two years regarding Clean Water Act (CWA) sections 303(d) and 305(b) to track overall surface water and ground water quality, causes and sources of impairments, and efforts to correct impairments of designated water quality and uses. GEPA's most current 2018 IR includes discussion of watershed and wetland trends. Wetlands and "marine waters" information is included here while watershed information is included in additional discussion of observed trends in the Cumulative and Secondary Impacts assessment.[4]

As the 2018 IR details, Guam is surrounded by 116.5 miles of shoreline divided into three distinct classifications: rocky coastline, sandy beaches, and mangrove mud flats. The rocky coastline classification surrounds the northern end of the island with a few isolated stretches in the south. It is approximately 72.5 miles in length or 62% of the total shoreline. Sandy beaches are scattered intermittently around the island and comprises 35.9 miles of shoreline or 31% of the total. The remaining 8.1 miles or 7% of the total shoreline are classified as mangrove mud flats and are centered mainly within Apra Harbor and Merizo. There are also approximately 14.2 square miles of coral reefs, 0.55 square miles of seagrass beds, 1.43 square miles of estuarine systems, and 21.73 square miles of marine bays. Excerpts from the CWA 303(d) and 305(b) water quality report are included here for further discussion of water quality in "marine waters" and "fresh waters" to provide additional details about water quality in palustrine and estuarine as well as riverine wetland systems.

Marine Waters

The 2018 IR indicates that Guam's marine waters are generally "good". This means that waters in this category reflect "sufficient quality to allow for the propagation and survival of marine organisms, particularly shellfish, and other similarly harvested aquatic organisms, coral and other reef-related resources, and whole-body contact recreation. Other important intended uses include mariculture activities, aesthetic enjoyment, and related activities" (IR, 2018, citing Guam Water Quality Standards). The 2018 IR notes that the National Coastal Condition Assessment (NCCA) is ongoing, and, although Guam participated in three NCCA surveys in 2005, 2010, and 2015, the survey results were not yet available for inclusion in the report. However, GEPA also indicates that applicable categories of causes or stressors for marine bays include pesticides, PCBs, dioxins, nutrients, pathogens, and dissolved oxygen. For recreational beaches the pathogen indicator *enterococcus* was the primary source of impairment. Gabgab Beach, a 0.65 mile stretch of shoreline, is impaired by PCBs in fish tissue. Overall, impairment of designated uses at recreational beaches is attributable to various source categories that include municipal point sources, combined sewer overflows, agriculture, urban runoff/storm sewers, contaminated sediments, and groundwater seeps/springs. The source of PCBs is still being investigated.

In the 2018 IR Marine Bays inventory, 66 waterbodies were classified for the assessment where:

- 8 marine bays meet some designated uses but more data is needed to make a use

[3] Guam Erosion & Sediment Control Field Guide, Version 2.0 for Contractors and Site Inspectors, prepared for the Guam Contractors Association Trades Academy by the Horsley Witten Group under contract with the NOAA Coral Reef Conservation Program, Sept. 2017, available at http://epa.guam.gov/wp-content/uploads/2019/04/ESC_fieldguide_Guam2017.pdf.

[4] Guam Environmental Protection Agency, *Section 303(d) and 305(b) Water Quality Assessment and Integrated Report*, 2018 (2018 IR, GEPA).

determination
- 47 marine bases were not assessed
- 11 marine bays are impaired

Together, a total of 14.76 square miles of "impaired bays" were reported in the 2018 IR – the same number as reported in the 2016 reporting period – with a total of 14.76 square miles in area with statuses including "fish advisories" and "seafood consumption advisories" due to non-attainment of one or more uses as detailed further in the table below.

Waterbody Name / Assessment ID	Size of Assessed Waterbody (m^2)	Status
Agat Bay 1 / GUG-010B-1	0.63	Fish Advisory
Tipalao Bay / GUG-010A	0.10	Fish Advisory
Apra Harbor 2 / GUG-008A-2	4.61	Fish Advisory
North Orote Peninsula Sea Cliffs / GUG-042	0.23	Fish Advisory
South Orote Peninsula Sea Cliffs / GUG-043	0.02	Fish Advisory
Cocos Lagoon 1 / GUG-20A-1	5.70	Fish Advisory
Cocos Lagoon 2 / GUG-20A02	0.34	Fish Advisory
Pago Bay / GUG-003A	0.7	>10% samples exceed WQS
Tanguisson Beach 2 / GUG-001B-2	0.4	Seafood Consumption Advisory
Tumon Bay / GUG-001C	1.98	Waters not Attaining Designated Uses

Coastal Waters

The 2018 IR assessed Guam coastal and recreational waters for the goal "Protect and Enhance Public Health" and the use "primary contact / swimming and secondary contact". Of the 115 inventoried coastal / recreational waterbodies:

- One (1) impaired recreational waterbody (assigned a "5" reporting category), Gabgab Beach, is located within a military installation. It is impaired because the waterbody is subject to a Fish Consumption Advisory.
- Forty-five (45) of Guam's recreational assessment units have an associated TMDL and are categories as 4a waterbodies

Fresh Waters

Fena Reservoir

The only inland body of water on Guam is Fena Reservoir, constructed by the Navy as a drinking water supply. The Fena Reservoir is the primary source of water for the U.S. Navy Water System and is supplemented by the Almagosa and Bona Springs. However, no assessment data was available for these surface water sources. Water from the reservoir and springs is processed at the Navy Water Treatment Plant before distribution. The Navy water system met all primary drinking water standards during the reporting period, as evidenced by the 2016 U.S. Navy Water System Water Quality Report.

Wetlands

One wetland, Agana Swamp, is included in the 2018 IR. This 6.40 acre water body is impaired due to detection of PCBs from the Agana Power Plant in fish tissue (see Table 8.SA of 2018 IR). As outlined by

Table 23 of the 2018 IR, only one of the 19 established wetland monitoring sites totaling over 1,962 acres was assessed during the 2018 reporting cycle.

Rivers and Steams

There are one hundred thirty-three (133) fresh water assessment units which represent two-hundred one (201) Guam rivers and streams. As detailed in the table below, seven river bodies or streams that total approximately 7.31 miles remain impaired and are carried forward on Guam's 2018 303(d) list. Two assessment units were delisted since the last reporting cycle.

Waterbody Name / Assessment ID	Size of Assessed Waterbody (m^2)	Pollutants	Source	Status
Agana River 1 / GUAGRA-3	0.52	Enterococcus, Dissolved Oxygen; PCBs in fish tissue	Agana Swamp for PCBs; urban runoff, storm sewers, contaminated sediments	Fish Advisory
Agana River 2 / GUAGRA-2-1-A	0.67			Fish Advisory
Pago River 1 / GUPGRP-1-51-A	0.06	E.coli, Dissolved Oxygen	Urban runoff, storm sewers, contaminated sediments	Water Quality Standard (WQS) Exceedances
Pago River 2 / GUPGRP-2	4.74			WQS Exceedances
Storm Drain / GUAGRD	0.21	E.coli, Dissolved Oxygen, Nitrate, Total Suspended Solids, Turbidity, Salinity	Urban runoff, storm sewers, contaminated sediments, sewer system/manhole overflows	WQS Exceedances
Lonfit River 2 / GUPGRL-2	1.07	Aluminum, Salinity, Temperature, Nitrate, Ammonia, Total Coliform, E. coli, Enterococcus, Iron, Manganese, Copper, Zinc, Chromium, Nickel, Total Suspended Solids, Total Dissolved Solids	Ordot Dump	Consent Decree
Lonfit River 3 / GUPGRP-1-51-B	0.04			Consent Decree

Northern Guam Lens Aquifer (NGLA) – Guam Sole Source Aquifer

The 2018 IR indicates that the overall water quality of the NGL is good. However, it is significantly vulnerable to contaminants, including chloride contamination induced from over pumping of water supply wells, and groundwater well influence by surface water or raw sewage from leaking sewer pumps or sewer pipes. Because of its designation as Guam's Sole Source Aquifer and because of the magnitude of incidences observed in which the levels of pollutants (Bacteria, Nutrients, Chlorides, and Toxic Contaminants) exceeded GWQS, action to restore, protect, and sustain the NGL remains a high priority for GEPA. In late 2013, Guam EPA announced that based on the results of comprehensive studies based on data acquired to make the "Groundwater under the direct influence of surface water" or GWUDI determination, Guam's groundwater is not considered Groundwater Under the Direct Influence of surface water. Because this is a special groundwater management area, and due to threats of cumulative and secondary impacts, the NGLA is discussed further in the SAMP and CSI sections.

Management Characterization:

1. Indicate if there have been any significant changes at the state or territory level (positive or negative) that could impact the future protection, restoration, enhancement, or creation of coastal wetlands since the last assessment.

Significant Changes in Wetland Management

Management Category	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N
Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition)	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

The 2011-2015 309 A&S Report noted that past 309 efforts included updating wetland delineations for Guam using 2007 Guam LiDAR and currently U.S. Fish and Wildlife's National Wetlands Inventory, NOAA's Coastal Change (C-CAP), and U.S. Forest Service vegetation cover (NA10NOS4190208). This project aimed to assist creation and implementation of laws and policies to "better protect, restore and enhance existing wetland areas and minimize development in the immediate surrounding areas". The report goes on to detail that there "have been many efforts to reduce sedimentation in coastal waters including the implementation of the soil erosion and sediment control regulations and the numerous reforestation projects in several of Guam's priority watersheds." It concludes that "continual updates of the wetlands data in a priority watershed will enable the GCMP to evaluate the effectiveness of these management measures." Numerous watershed-focused activities have occurred during this current reporting period, and these are detailed further in the SAMP section.

While no significant changes in management programs have occurred, GEPA did update their water quality standards in 2015 and issued a revised erosion and sediment control field guide in 2017 that aims to help contractors meet the requirements of Guam's National Pollution Discharge Elimination System and Water Quality Standards and the 2006 CNMI/Guam Stormwater Management Manual (22 GAR-2-Chapter 10). This project was supported by funding provided by the NOAA Coral Reef Conservation Program, U.S. Department of Interior, and U.S. EPA. The best practices outlined in the guide aim to reduce risk of development impacts to wetlands and coastal habitats.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High _____

   Medium _X_

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Although wetland management planning is important, existing laws and regulations require assessment and permitting at both federal and territorial levels for any development proposed in wetland areas. Additionally, data inconsistencies and continued reliance on estimates from decades old assessments make it challenging to confirm with high confidence how much change has occurred to wetland systems on Guam. Comments received in the 2020 Stakeholders Survey indicated a "shortage of available local wetland expertise – i.e. soil scientists, botanists, laboratory analytical services" and "location of wetlands" as leading management challenges on Guam, and suggested there may be opportunities to update Guam's 2001 Wetland Conservation Plan, which appears to rely primarily on BSP's 1991 Wetlands Guidebook which references the 1983 USFWS Wetlands Inventory. Another commenter suggested to address wetland management challenges, priorities might include new policies and developing laws that are meant to protect, restore and enhance wetland areas and reduce development in the surrounding areas.

Threats were identified and potential solutions discussed in this 309 assessment update process, and the 2020-2022 National Coral Reef Management Fellow's project focus on assessing and managing mangrove and seagrass habitats will produce important data and planning support tools during this five-year period. However, because wetland resources are managed through multi-agency and multi-jurisdictional processes, expanded coordination in data collection and planning would require considerable collaboration, investment of resources, and expansion of partnerships at the local and national level. Especially given current funding challenges and the high level of importance of other enhancement areas identified through the 2020 Stakeholders Survey conducted for this assessment report, GCMP did not elect to change the priority level of wetlands management from the last report and is maintaining the "medium" priority designation.

Coastal Hazards

Section 309 Enhancement Objective: Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise … . §309(a)(2)

Note: For purposes of the Hazards Assessment, coastal hazards include the following traditional hazards and those identified in the CZMA: flooding; coastal storms (including associated storm surge); geological hazards (e.g., tsunamis, earthquakes); shoreline erosion (including bluff and dune erosion); sea level rise; Great Lake level change; land subsidence; and saltwater intrusion.

Resource Characterization:

1. In the table below, indicate the general level of risk in the coastal zone for each of the coastal hazards.

General Level of Hazard Risk in the Coastal Zone

Type of Hazard	General Level of Risk[5] (H, M, L)
Flooding (riverine, stormwater)	H
Coastal storms (including storm surge)	H
Geological hazards (e.g., tsunamis, earthquakes)	Tsunami: M Earthquakes: H
Shoreline erosion	H
Sea level rise	H
Great Lakes level change	N/A
Land subsidence	L
Saltwater intrusion	H
Other: Fire, Landslides	Fire: H Landslides: M

2. If available, briefly list and summarize the results of any additional data or reports on the level of risk and vulnerability to coastal hazards within your state since the last assessment.

Several geospatial information systems updates including revised fire mapping and extents and area-specific flood assessments were completed in the past reporting period. Updated data is listed briefly here and an overview of the 2019 Guam Hazard Mitigation Plan, Agat Bay Shoreline Assessment, Comprehensive Flood Assessment (USACE, 2020), and 2019 Climate Change Vulnerability Assessment are provided for further discussion of relevant reports that have been published since the last assessment.

[5] Risk is defined as "the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage." *Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001*

Data / GIS completed since the last assessment:

Updated Sea Level Rise and Vulnerability Assessment GIS:[6] To support the UoG-BSP Climate Change Vulnerability Assessment and ongoing Climate Action Planning projects, updated models were developed using a mix-method approach to assess vulnerability of Guam's built environment using projections for three sea level rise (SLR) scenarios – three, five, and ten-foot. As discussed further in the summary of the analysis report that follows, the GIS SLR projections resulted in estimates of 58% of total infrastructure impacted by a 3-ft SLR, 74% impacted by a 5-ft SLR, and 84% impacted by a 10-ft SLR.

Interactive Fire Mapping Tool, 2015-2020:[7] This geospatial information system (GIS) tool has been developed by the Guam Department of Agriculture to support forest management planning data needs. It is available at https://rb.gy/gh2ueg.

Reports completed since the last assessment:

Guam Hazard Mitigation Plan Update, 2019:[8] The 2019 Guam Hazard Mitigation Plan (GHMP) was approved and adopted on July 26, 2019 through Executive Order No. 2019-18. The plan is a living document that will be updated every 5 years, as required by the federal Disaster Management Act of 2000. This process aims to ensure that, during the 5 years before an update, the plan should be implemented as much as possible to create an increasingly strong "all-hazards" mitigation environment and a sustainable "all-hazards" mitigation community on Guam. Guam Homeland Security / Office of Civil Defense prepared the 2019 which was led by the Guam Hazard Mitigation Officer (GHMO) with significant assistance from numerous Government of Guam agencies and other interested parties. The Bureau of Statistics and Planning supported this process as a member of the Hazard Mitigation Advisory Committee (HMAC). The 2019 Guam HMP is designed as an instrument of mitigation, primarily for natural disasters and other environmentally-related events, and will be updated again by 2024.

The 2019 GHMP update includes discussion of climate impacts building out from the focus on sea level rise identified in the 2014 update which aimed to include consideration of climate change but noted that prior GHMPs already addressed many impacts such as coastal erosion, drought, flooding, and wildland fire. The GHMP acknowledges uncertainties regarding storm and precipitation projections and states that "climate change on Guam will likely have its most immediate impact as an increase in sea level" with predictions indicating a "1-foot rise by 2050 and a 3-foot rise by 2100" and also notes that "warmer and more acidic oceans are likely to disrupt coastal and marine ecosystems on Guam". Significant updates from the 2014 plan to 2019 are the identified additions to the mitigation actions for Guam. The mitigation strategy has been expanded and nearly doubled from 2014 to include 60 actionable items. The 2019 Guam HMP demonstrates Guam's continued commitment to reducing the risk of losses from natural and

[6] Sea level rise maps are available in Appendix 2 of the report, King et al., *Vulnerability Assessment of Built Infrastructure near Coastal Bays using three Sea Level Rise Scenarios - Guam*, 2019 (2019 SLR VA).
[7] J. Dendy, *Guam Wildfires 2015 – 2020*, prepared for the Guam Department of Agriculture, 2020, available at https://rb.gy/gh2ueg. Map created with support from Institute of Pacific Islands Forestry (IPIF), and Coral Reef Research Foundation, Palau
[8] Guam Homeland Security / Office of Civil Defense, 2019 Guam Hazard Mitigation Plan, July 2019 (GHMP, 2019), available at https://ghs.guam.gov/sites/default/files/final_2019_guam_hmp_20190726.pdf.

human-made threats and serves as a strategic planning guide for Guam's decision-makers as they commit resources to reduce the effects of these hazards.

Six (6) mitigation goals provide the foundation for the 2019 Guam HMP. Five (5) of these six (6) goals were originally developed for the 2005 Guam HMP through solicitation of the HMAC and through various meetings with Government of Guam agencies and other organizations. Although additional hazards have been added to the Guam HMP in subsequent updates, the GHMO and HMAC determined that the existing mitigation goals continue to address both existing and new hazards. During the 2019 Guam HMP update process, the sixth goal was added.

The goals are as follows.

Goal 1: Improve the quality and comprehensiveness of information on assets and hazards

Goal 2: Reduce risks of disaster damage to existing buildings and infrastructure, especially Essential Facilities, Major Utilities, and Transportation System (EFMUTS)

Goal 3: Promote disaster-resistant development and disaster recovery

Goal 4: Develop institutional support of hazard mitigation within the Government of Guam agencies and the public

Goal 5: Protect human health and safety

Goal 6: Eliminate or reduce the damage to residential property and the disruption of life caused by repeated flooding

The goals identified for the 2019 Guam HMP serve as the foundation of the Government of Guam's overall mitigation strategy. Although Table 6-4 of the GHMP identified a total of 60 action items, the GHMO and GHS/OCD Mitigation staff aim to work with various members of the HMAC and the Government of Guam to fund and implement identified "high priority" mitigation actions, thereby contributing to the overall Government of Guam's overall mitigation strategy and goals.

Section 6 of the GHMP reviewed 2014 mitigation plans and implementation strategies to determine the status and relevancy for inclusion in and prioritization for the 2019 potential mitigation actions list. Relevant pending actions underway with BSP or relevant to coastal hazard management include:

Capability Category	Pre / Post Disaster	Effects Development in Hazard Prone Areas	Description
Seashore Reserve Zone	Pre and post	Yes	The BSP is in the process of updating the seashore reserve zone ordinance base on technical studies done as a collaborative approach to understand our near shore areas. The update of the seashore reserve zone ordinance is likely to result in the extension of the reserve boundary and changes to land use permitted in the reserve. Extending the seashore reserve and limiting types of development within the seashore reserve zone would create an opportunity to further regulate inappropriate development in hazard-prone areas. The new seashore reserve plan is scheduled to be released in the spring of 2021.
Comprehensive Planning	Pre-disaster	Yes	The North and Central Guam Land Use Plan is an approved element of the Guam Comprehensive Development Plan. Building resilient communities is a fundamental tenant of the plan. BSP uses is

Capability Category	Pre / Post Disaster	Effects Development in Hazard Prone Areas	Description
			planning authorities to leverage resource in order to create a greater impact.
Comprehensive Planning	Pre and post	Yes	BSP-GCMP developed an Emergency Response for Impacts on the Environment from Natural Disasters reference guide the purpose of the study is to review the success and failures and level of action in responding to environmental impacts of natural disasters in the past and to develop information and ideas necessary for drafting comprehensive, response plan.
Floodplain Management / National Flood Insurance Program (NFIP)	Pre- and post	Yes	Guam's floodplain management ordinance was adopted in 1998 in Executive Order 98-30. Guam's floodplain management ordinance guides the management of all floodplain areas, as determined by FEMA maps for flood boundaries and flood insurance. The ordinance enables DPW to oversee management of floodplain areas in a manner that mitigates against tropical cyclone, flood and tsunami events. The floodplain management ordinance meets the minimum requirements of the NFIP, which is discussed below. The NFIP is a voluntary program, whereby a community adopts and enforces ordinances that meet or exceed the minimum floodplain management requirements of the NFIP to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. In addition, membership in the NFIP enables Guam to apply for capital-intensive hazard mitigation assistance grants from FEMA hazard mitigation programs, including the PDM, FMA, Severe Repetitive Loss (SRL), and Repetitive Flood Claim (RFC) Programs. Guam became a participating community in the NFIP in November 1985. Guam was placed on probation in April 1992 due to numerous structural and procedural violations. Guam remained on probationary status for 16 years due to numerous structural and procedural NFIP violations. In April 2008, FEMA lifted Guam's probationary status and reinstated Guam into the NFIP. *Note: The NFIP was focused on Hagatna. BSP reports that updates to the Flood Insurance Rate Map (FIRM) were initiated with FEMA and planning partners in the summer of 2020, discovery meetings are ongoing, and updated floodzone maps are anticipated over the next planning period.*
Stormwater Management	Pre-disaster	No	The CNMI/Guam Stormwater Management Manual was released in October 2006. In addition, DPW released a Stormwater Drainage Master Plan in 2010. The Master Plan outlines a systematic approach for identify existing stormwater runoff patterns and drainage system and prioritizing drainage improvements, especially in areas of development, for the island of Guam. The Guam Silver Jackets Committee noted that the DPW Plan does not adequately provide stormwater management specifications to adequately manage

Capability Category	Pre / Post Disaster	Effects Development in Hazard Prone Areas	Description
			storm water. However, GCMP is currently working with the US Army Corps of Engineer to produce a updated Guam Storm Drainage Manual as part of the und Phase II of the Guam Comprehensive Flood Study. *Note: BSP indicates that ongoing stormwater management planning discussions are underway with DPW and GEPA with support from USACE.*
Source: Table 6-1: Pre- and Post-Disaster Mitigation Policies and Programs, GHMP, 2019, with updates in italics provided by BSP-GCMP to support the 2020 309 Assessment and Strategy Report.			

Agat Bay Regional Shoreline Assessment, 2020:[9] The Honolulu District of the U.S. Army Corps of Engineers (USACE), at the request of Government of Guam Bureau of Statistics and Plans (GovGuam), conducted a regional study of the Agat shoreline located on the Island of Guam to identify areas of significant shoreline erosion, determine the causes of the erosion, develop conceptual plans for shoreline stabilization, and investigate various modifications to Agat Small Boat Harbor to address issues experienced by harbor users. The study area is along the western shoreline of Guam, within Agat Bay just south of Apra Harbor. It extends from Apaca Point (just north of the Namo River) south to Facpi Point, a distance of approximately five miles. Areas of particular interest within the region are the Inn on the Bay, the Agat Mayor's Office, Apra Small Boat Harbor (SBH), and Nimitz Beach Park. Erosion has been observed in these locations, with various types of infrastructure being impacted. Overall, the variability in erosion and accretion along the shoreline shows that sediment movement within the region is complex, and not strongly dominant in one direction or the other alongshore, but rather influenced by small circulation cells controlled by bathymetry and coastal morphology.

Based on the combined results of both the historical shoreline change analysis as well as the wave, circulation, and PTM modeling, it is evident that the dominant direction of sediment transport along the shoreline north of Agat SBH is from north to south, both prior to and after construction of the harbor. At Nimitz Beach Park, the dominant direction of transport is now from south to north, differing from pre-harbor conditions. Therefore, construction of the harbor has likely altered dominant sediment transport direction in this location. Erosion at Inn on the Bay and the Agat Mayor's Office is due in part to a trend of offshore transport during typical and extreme wave events, caused by wave-generated currents. This may also have been exacerbated in recent years by higher than normal water levels in the western Pacific. The analysis shows that overall, there is a deficit of sediment in the region, and that exploration of beneficial use of dredged sediment, as well as offshore and upland sand deposits is warranted in order to replace some of the sand that has been lost.

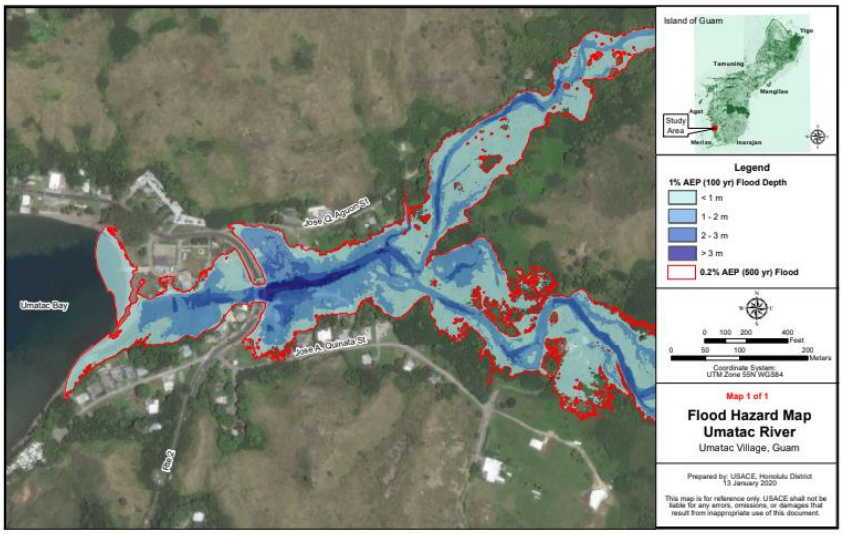
Comprehensive Flood Assessment, 2020:[10] The Guam Comprehensive Flood Study represents a collaborative approach between the US Army Corps of Engineers (USACE) and the Government of Guam to understand flooding hazards across the island, focusing on Manell, Umatac, and Namo Rivers. The technical work done by USACE is meant to serve as the planning framework that the Government of Guam will use to work toward reducing flood risk for its communities. The purpose of the study is to

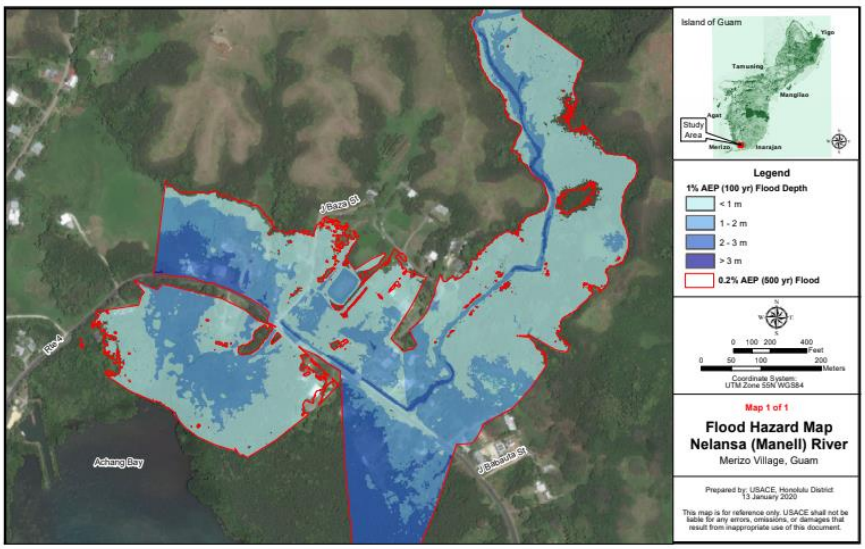
[9] Agat Bay Regional Shoreline Assessment, prepared by the U.S. Army Corps of Engineers Honolulu District for the Government of Guam Bureau of Statistics and Plans, March 2020.
[10] Guam Comprehensive Flood Study, prepared by the U.S. Army Corps of Engineers Honolulu District for the Government of Guam Bureau of Statistics and Plans, March 2020.

provide the Government of Guam with 1) an update of the regional flood frequency analysis for southern Guam; 2) site-specific hydrologic and hydraulic analysis of two to four flood prone areas within the inventory; and 3) preliminary flood mitigation design concepts for the aforementioned sites. Documentation for the study was divided into four parts:

Part 1 – Flood Frequency Estimates for Streams on Guam
Part 2 – Flood Hazard Study for Umatac River, Guam
Part 3 – Flood Hazard Study for Manell River, Guam
Part 4 – Flood Hazard Study for Upper Namo River, Guam

The document presents information to 1) provide estimates of the magnitudes of the 50%, 20%, 10%, 4%, 2%, 1%, 0.4%, and 0.2% Annual Exceedance Probability (AEP) peak stream discharges at gaged sites on Guam, using recorded annual peak discharges through water year 2019, and 2) develop regression equations that can be used to estimate the magnitude of the 50%, 20%, 10%, 4%, 2%, 1%, 0.4%, and 0.2% AEP peak stream discharges at ungaged, unregulated sites in southern Guam. Watershed management implications are discussed further in the SAMP section, however, updated flood maps are included here for further reference.





Updated Sea Level Rise and Vulnerability Assessment, 2019:[11] As the 2019 *Vulnerability Assessment of Built Infrastructure near Coastal Bays using three Sea Level Rise Scenarios, Guam,* report (2019 SLR VA) details, global mean sea level (GMSL) is rising and accelerating. GMSL rise is a certain impact of climate change; the questions are when, and how much, rather than whether impacts will occur. To answer these questions, the 2019 SLR VA used a participatory mapping approach to identify and assess potential impacts to critical infrastructure due to sea level change.

The 2019 SLR VA also included the creation of a Social Vulnerability Index (SVI) that identified the most vulnerable municipalities on Guam by analyzing a series of variables from the U.S. Census. Of the villages, the greatest percentage of infrastructure impacts were identified in southern villages as depicted in Tables 19, 20, and 21 from the report, as well as SVI analysis and maps reflected in an excerpt of Tables 43 and Figure 22 are included below. The full report is available at BSP's website here: http://bsp.guam.gov/guamccva/

The following tables highlight specific risks to built infrastructure by municipality based on a 3-ft (Table 19), 5-ft (Table 20), and 10-ft (Table 21) SLR scenario.

Table 19: Percentage of infrastructure impacted within each municipality under a three -foot SLR scenario.

Village	Streets (feet)	Highways (feet)	Bridges	Buildings	GovGuam buildings	Power lines (feet)	Power substations	Water lines (feet)	Water pump stations	Production wells	Sewer lines (feet)	Sewage pump stations	Sewage treatment plants
Agana Heights	0	0	0	0	0	0	0	0	0	0	0	0	0
Agat	4.8	1.5	0	9.4	0	9.5	0	4.9	0	0	7.5	0	0
Asan	1.4	2.8	0	3.5	0	0.43	0	4.1	0	0	2.8	0	0
Barrigada	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalan Pago Ordot	0.17	0	0	0	0	5.6	0	0	0	0	28	0	0
Dededo	0	0	0	0	0	0	0	0	0	0	4.6	0	0
Hagatna	2.1	5.5	0	8.2	0	4.1	0	5.4	0	0	5.8	0	0
Inarajan	5.4	12	60	9.4	0	6.9	0	11	0	0	5.5	0	0
Mangilao	0	0	0	0	0	0	0	0	0	0	0	0	0
Merizo	30	66	20	27	0	26	0	39	0	0	11	100	0
Mongmong Toto Maite	0	0	0	0	0	0	0	0	0	0	0	0	0
Piti	28	0	0	28	0	44	0	30	0	0	0	0	0
Santa Rita	19	0	0	11	0	0.54	0	0	0	0	2.1	0	0
Sinajana	0	0	0	0	0	0	0	0	0	0	0	0	0
Talofofo	0	0	0	0	0	0	0	0	0	0	0	0	0
Tamuning	0.21	0	0	2.4	0	1	0	0	0	0	28	0	0
Umatac	1.1	2.8	20	1.2	0	0.61	0	2.3	0	0	4.7	0	0
Yigo	3.0	0	0	0	0	0	0	0	0	0	0	0	0
Yona	4.9	10	0	0	0	1.6	0	2.6	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**0**	**100**	**0**	**100**	**0**	**0**	**100**	**100**	**0**

[11] King, R., M. Higgs, E. Leon-Guerrero, *Vulnerability Assessment of Built Infrastructure near Coastal Bays using three Sea Level Rise Scenarios – Guam,* Dec. 2019, available at http://bsp.guam.gov/guamccva/

Table 20: Percentage of infrastructure impacted within each municipality under a five -foot SLR scenario.

Village	Streets (feet)	Highways (feet)	Bridges	Buildings	GovGuam buildings	Power lines (feet)	Power substations	Water lines (feet)	Water pump stations	Production wells	Sewer lines (feet)	Sewage pump stations	Sewage treatment plants
Agana Heights	0	0	0	0	0	0	0	0	0	0	0	0	0
Agat	2.0	0.52	0	14	100	18	0	8.2	0	0	10	0	0
Asan	0.40	0.67	0	0.76	0	0.11	0	1.3	0	0	1.7	0	0
Barrigada	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalan Pago Ordot	1.0	0	11	1.5	0	4.1	0	1.4	0	0	7.7	0	0
Dededo	0	0	0	0	0	0	0	0	0	0	1.3	0	0
Hagatna	8.8	1.5	11	14	0	9.4	0	2.3	0	0	1.6	0	0
Inarajan	13	14	33	8.1	0	14	0	22	0	0	18	0	0
Mangilao	0	0	0	0	0	0	0	0	0	0	0	0	0
Merizo	30	77	11	32	0	33	0	45	0	0	28	67	0
Mongmong Toto Maite	0.25	1.0	0	2.8	0	0.60	0	0.64	0	0	0.50	0	0
Piti	14	0	0	16	0	16	0	16	0	0	0.72	0	0
Santa Rita	26	1.5	0	7.1	0	3.3	100	0	0	0	11	0	0
Sinajana	0	0	0	0	0	0	0	0	0	0	0	0	0
Talofofo	0	0	11	0.25	0	0.27	0	0.13	0	0	0	0	0
Tamuning	1.2	0	0	3.3	0	1.0	0	0	0	0	19	33	0
Umatac	0.29	0.84	11	0.76	0	0.21	0	0.58	0	0	1.4	0	0
Yigo	1.1	0	0	0	0	0	0	0	0	0	0	0	0
Yona	1.1	3.5	11	0	0	0.40	0	2.2	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**0**	**0**	**100**	**100**	**0**

Table 21: Percentage of infrastructure impacted within each municipality under a ten -foot SLR scenario.

Village	Streets (feet)	Highways (feet)	Bridges	Buildings	GovGuam buildings	Power lines (feet)	Power substations	Water lines (feet)	Water pump stations	Production wells	Sewer lines (feet)	Sewage pump stations	Sewage treatment plants
Agana Heights	0	0	0	0	0	0	0	0	0	0	0	0	0
Agat	14	16	0	19	38	18	0	17	0	0	24	16	0
Asan	0.071	0.066	0	1.2	0	0.48	0	0.58	0	0	1.3	0	0
Barrigada	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalan Pago Ordot	1.1	1.4	0	0.68	0	2.0	0	2.0	0	0	1.7	5.3	0
Dededo	0	0	0	0	0	0	0	0	0	0	1.7	0	0
Hagatna	18	18	22	23	38	21	0	22	0	0	16	5.3	0
Inarajan	9.3	13	33	6.0	0	12	0	11	100	0	4.9	11	0
Mangilao	0	0	0	0	0	0	0	0	0	0	0	0	0
Merizo	11	18	11	14.3	0	13	0	11	0	0	8.8	42	0
Mongmong Toto Maite	0.27	0	0	0.68	0	1.1	0	0.26	0	0	0.051	0	0
Piti	16	20	0	14	25	21	60	18	0	0	9.4	11	0
Santa Rita	18	1.2	0	10	0	1.8	40	0	0	0	14.7	0	0
Sinajana	0.27	0	0	0	0	0.13	0	0	0	0	0	0	0
Talofofo	0.18	0	0	0.13	0	0.53	0	0	0	0	0	0	0
Tamuning	10	12	0	11	0	9.1	0	14	0	100	15.4	5.3	0
Umatac	0.21	0.066	11	0.94	0	0.36	0	0.18	0	0	1.4	5.3	0
Yigo	0.24	0	0	0	0	0	0	0	0	0	0	0	0
Yona	1.0	1.4	11	0	0	0.64	0	4.5	0	0	0.25	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**0**

Under the 10-ft SLR scenario, the Hagatna was identified as having the largest percentages of impacted facilities within all villages and between villages based on the infrastructure assessed. Agat was identified as the "most vulnerable" based on analysis of fifteen identified variables from 2010 Census data, followed by Mongmong-Toto-Maite and then Hagatna (see Table 43 and Figure 22 on the next page).

SVI – Summary Table and Map

Table 43: E1 - Social Vulnerability Index - Guam. Higher percentile rank represents higher vulnerability. Calculated using methodology outlined by CDC for SVI. Source: US Census 2010.

Municipality	Non-Percentile Rank	Percentile Rank	
Piti	1	5.26	Least Vulnerable
Santa Rita	2	10.53	
Asan-Maina	3	15.79	
Talofofo	4	21.05	
Inarajan	5	26.32	
Yona	6	31.58	
Chalan Pago-Ordot	7	36.84	
Tamuning	8	42.11	
Agana Heights	9	47.37	
Yigo	10	52.63	
Sinajana	11	57.89	
Barrigada	12	63.16	
Umatac	13	68.42	
Dededo	14	73.68	
Mangilao	15	78.95	
Merizo	16	84.21	
Hagatna	17	89.47	
Mongmong-Toto-Maite	18	94.74	
Agat	19	100	Most Vulnerable

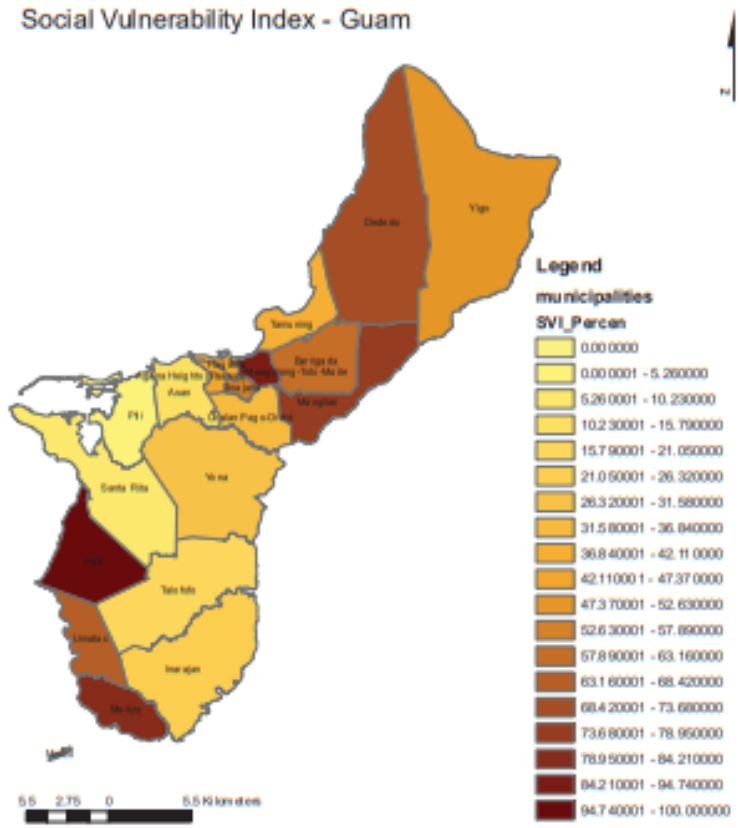


Figure 22: Map of Guam - SVI

Source: Updated Sea Level Rise and Vulnerability Assessment, 2019, pg. 57, available at http://bsp.guam.gov/guamccva/

Management Characterization:

1. In the tables below, indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred that could impact the CMP's ability to prevent or significantly reduce coastal hazards risk since the last assessment.

Significant Changes in Hazards Statutes, Regulations, Policies, or Case Law

Topic Addressed	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Elimination of development/redevelopment in high-hazard areas, based on state definition	Y	Y	N
Management of development/redevelopment in other hazard areas	Y	Y	N
Climate change impacts, including sea level rise or Great Lakes level change	Y	Y	N

Significant Changes in Hazards Planning Programs or Initiatives

Topic Addressed	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Hazard mitigation	Y	Y	Y
Climate change impacts, including sea level rise or Great Lakes level change	Y	Y	Y

Significant Changes in Hazards Mapping or Modeling Programs or Initiatives

Topic Addressed	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Sea level rise or Great Lakes level change	Y	Y	Y
Other hazards	Y	Y	Y

2. Briefly state how "high-hazard areas" are defined in your coastal zone.

High hazard areas are those areas that are defined and delineated as flood hazard zones by FEMA.

3. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and

c. Characterize the outcomes or likely future outcomes of the changes.

Significant Changes in Hazards Statutes, Regulations, Policies, or Case Law

There were no significant changes in hazards statues, regulations, policies, or case law during this reporting cycle. Changes to planning programs or initiatives and hazards mapping or modeling programs are described further below.

Significant Changes in Hazards Planning Programs or Initiatives

Guam's Hazard Mitigation Plan (GHMP) was updated and adopted to supersede the 2014 plan in 2019. This plan provides an in-depth guide for local decision makers to reduce the potential impact of identified hazards. Approval of this plan results in Hazard Mitigation Grant Program funding from FEMA per 5-year hazard mitigation planning cycle. BSP-GCMP was identified as a lead or supporting agency for several of the "high priority" mitigation action items identified in the 2019 update.

As discussed in the preceding section, additional risk models, tools, and analysis were developed to support area- and resource-specific risk assessments that will support more in-depth risk reduction planning efforts specific to sea level rise, flooding, tsunami, as well as fire and landslide risks.

Significant Changes in Hazards Mapping or Modeling Programs or Initiatives

Significant changes or updates in hazard mapping or modeling programs or initiatives include

Tsunami Risk Models and Evacuation Maps[12]

Guam's Homeland Security / Office of Civil Defense provided updated tsunami evacuation routes for:

- Agat Santa Rita
- Apra Harbor
- East Hagatna-Tamuning
- Hagatna
- Inarajan
- Ipan Talofofo
- Pago Bay
- Piti Asan
- Tumon Tamuning
- Umatac Merizo

Sea Level Rise Viewer[13]

This reporting cycle, NOAA's Digital Coast's Sea Level Rise Viewer dataset was expanded to include Guam. Use this web mapping tool to visualize community-level impacts from coastal flooding or sea level rise up to 10 feet above average high tides. These flood extents were included in SLR and Social

[12] Guam Homeland Security / Office of Civil Defense, Programs: Natural Disasters – Tsunamis, available at https://ghs.guam.gov/programs/natural-disasters/tsunamis

[13] NOAA Digital Coastal Sea Level Rise Viewer, available at https://coast.noaa.gov/slr/.

Vulnerability analysis conducted in partnership with UoG and are reflected in the 2019 SLR VA. The 2019 Vulnerability Assessment highlighted village level infrastructure vulnerabilities which will support additional analysis and risk reduction planning.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High __X__

   Medium _____

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

While flooding presents substantial risks to people, property, and the environment, stakeholder also identified other coastal hazards as potential impacts of concern in this assessment cycle. These survey results, combined with the renewed emphasis on comprehensive risk reduction planning in the 2019 GHMP update support the expansion of the definition of "coastal hazards" in this 309 Assessment and Strategy Report to include all natural hazards within the coastal zone, including fires and landslides. This expanded definition reflects the existing efforts underway within GCMP to support hazard risk reduction planning needs identified in the 2019 GHMP update, the 2019 Sea Level Rise Vulnerability Assessment, and the 2020 flood assessments for Agat, Manell, Umatac, and Namo Rivers.

Read together, these documents highlight a convergence of data that indicates infrastructure and communities may be especially at risk of natural hazards in flood-prone and steep-sloped areas. These potentially "high risk hazard areas" would benefit from additional risk reduction planning dialogs which are anticipated to occur during the upcoming planning cycle. Furthermore, these planning dialogs are likely to complement "SAMP" and "CSI" focused assessment and management efforts that are underway and will continue through this upcoming planning cycle. As such, the GCMP is supportive of the inclusion of "coastal hazards" as "high priority" enhancement area that can be considered for further strategy development in this 309 Assessment and Strategy Report.

Public Access

Section 309 Enhancement Objective: Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value. §309(a)(3)

Resource Characterization:

1. Use the table below to provide data on public access availability within the coastal zone.

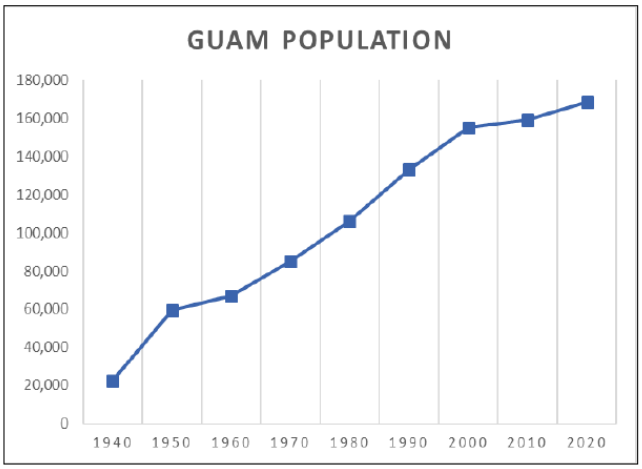
Public Access Status and Trends

Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, unkwn)	Cite data source
Beach access sites	211	↓	Observation – continued reports of enforcement / access concerns, restricted access on base
Shoreline (other than beach) access sites	99	↓	Observation / news reports regarding base access restrictions
Recreational boat (power or nonmotorized) access sites	8	No change	BSP-GCMP
Number of designated scenic vistas or overlook points	14	No change	Dept. of Parks and Recreation
Number of fishing access points (i.e. piers, jetties)	8	No change	Observation
Coastal trails/ boardwalks	18+	Unknown	Department of Parks and Recreation 2006 Comprehensive Outdoor Recreation Plan
Number of acres parkland/open space	184 sites, 1,461.93 acres of DPR Parks with 53 parks in the Guam Territorial Park System, National Parks System 926 acres;	Unknown	2015 Shoreline Access Survey results (DCRM study, unpublished)

Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, unkwn)	Cite data source
Access sites that are Americans with Disabilities Act (ADA) compliant	At least 2	↑	War in the Pacific National Historical Park website specifically mentions ADA access – no other sites listed / observed, although notes commitment by NPS to make facilities and services accessible One (1) ADA fishing ramp at Paseo de Susana Park as reported in 309 assessment stakeholder meetings
Other			

2. Briefly characterize the demand for coastal public access and the process for periodically assessing demand. Include a statement on the projected population increase for your coastal counties.

High demand for shoreline public access in Guam persists due to the reliance on the shoreline by residents for recreational activities, subsistence fishing, and commercial activities, and the high volume of tourists that visit Guam each year. In the Public Access surveys and resulting report, stakeholder interviews, a quantitative resident survey, and qualitative document review and field observations confirm that public shoreline access is an important coastal resource for Guam. Beach access and the quality of the beach and ocean resource is obviously central to the success of the hotel districts and tourist-driven economy. Shoreline access is also a central part of the local economy and culture, including small-scale fishing, boating and general public recreation. More than half of Guam's residents go the beach or other coastal area more than once a month, including to swim in the ocean and enjoy beach recreation; nearly a third visit more than twice a month. Of the majority of Guamanians that visit the beach or coastline at least once a month or more, 25% said having access was important, and 64% felt it was very important. Most coastal visitors drive there, and many are concerned about the cleanliness and safety of the beaches.



Guam Population, 1940-2020 (projected); Public Access Report.

Discussion of projected population changes was included in Public Access Stakeholder Engagement and Inventory Report (Public Access Report).[14] The Public Access Report notes that Guam has experienced steady population growth since the end of WWII. As shown in Figure 10, the rate of growth has slowed in recent decades,

[14] Public Access Stakeholder Engagement and Inventory Report, 2019, prepared by Market Research & Development, Inc., for Guam Bureau of Statistics and Plans (Public Access Report).

but the population nonetheless continues to increase and is projected to be over 168,000 in 2020, and that population is a major diver of development and associated impacts to the shoreline, including public access and recreation. According to Census data, the total number of land parcels (subdivision) and buildings (construction) continues to increase in Guam. In recent years, real estate transactions, land values and residential prices have also increased. Real estate sales, for example, increased by nearly 50% from 2013 to 2017. The number of visitors to Guam has steadily increased from about 100,000 in 1972 to approximately 1.5 million in 2019. Assessment of population growth suggests these trends are likely to continue.

As the Public Access Report details, together, population growth and visitation drive both the demand for shoreline access use and potential conflicts between different user groups, especially tourism-driven demand and local community use of the shoreline. This may be particularly the case in the Tumon area, given that tourist demand and resident use are concentrated here (see survey results, which discusses that almost half of surveyed residents uses beaches in Tumon). The possible population increase associated with any expansion of the U.S. military presence will also contribute to both total demand for coastal access and potential conflicts, such as continued restrictions on access to beaches adjacent to military lands (e.g. Haputo and Gab beaches). Another potential consequence of increased growth and development, particularly in less developed areas, may be the incremental loss of existing informal or prescriptive accessways. The issue of losing historic accessways, such as bull cart paths and other traditional routes to the shoreline, has long been a concern, and was the specific focus of the 1987 Ocean Shore Public Access Law. The Public Access Report suggests that it may become increasingly important to consider the expansion of more formal accessways to the shoreline in rural areas where private property is developing.

3. If available, briefly list and summarize the results of any additional data or reports on the status or trends for coastal public access since the last assessment.

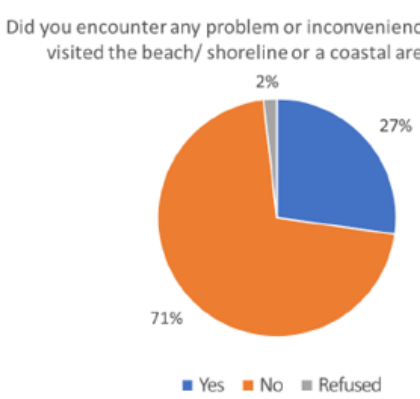
Public access guides are currently limited to commercial publications. However, in the last reporting cycle, BSP-GCMP completed the public access assessment and report and which will be used to develop a Public Access Stakeholder Engagement and Inventory project. Based on both a qualitative and quantitative investigation of attitudes and behavior relevant to improving coastal access confirm that public shoreline access is an important coastal resource for Guam.

The Public Access Report provides in-depth survey of 417 randomly selected respondents over a 10-day period in September, 2019, to assess information regarding public perception of beach and shoreline access on Guam. Significant findings of this survey included:

- Slightly more than half (52%) of all adult Guamanians go to the beach at least once a month. A third (33%) visit the beach or a coastal area twice a month or more. Twenty-five percent of beach goers (25%) said beach access was important, and some 64% felt it was very important.
- The majority of Guamanians that go to the beach enjoy swimming and wading (71%), followed by beach recreation (62%) which includes picnicking and beach sports. Fishing from shore (16%), hiking and jogging (14%), snorkeling (13%), and SCUBA or free diving (11%) and fishing from a boat (11%) were the next most frequently mentioned activities.

- Regardless of where people live on the island, their propensity to visit the beach was the same. There is no statistically significant relationship between where residents live on the island and how often they go to the beach.
- Nearly half (47%) of those that visited a beach in the last month indicated they visited one of the coastal access points along Tumon Bay. Residents that lived in the north and central villages of Guam were most likely to go to Tumon (56%). Residents in southern Guam were most likely to visit coastal areas in southeastern Guam (31%) or the most southern coastline of the island (33%).
- Almost a third (27%) of respondents that visit the beach at least once a month encountered a problem or inconvenience of some kind the last time they went to the beach or visited the coastline. More than a third of those that had visited a beach in the last month (37%) said they encountered too much trash. Slightly fewer (29%) indicated that there was a lack of parking. Some fourteen percent (14%) felt the beaches were too crowded and ten percent (10%) indicated that they did not feel safe at the beach or coastal area. Of the twenty percent (20%) of respondents that identified "Other" concerns, the most frequently mentioned issues were locked bathrooms (5%) and the lack of showers (3%).

Problems or Inconveniences Encountered At the Beach or Coastal Area



- When asked if there are sufficient beach and shoreline access points on Guam, more than three quarters (77%) of those surveyed felt the access currently provided was sufficient. Only fourteen percent (14%) disagreed. The fourteen percent of respondents that indicated that there was insufficient access, felt strongly about it. Some three quarters (75%) felt that the issue was important to them.
- Nearly nine in ten of those surveyed (87%) indicated that it is important for the government to invest public funds to improve beach and coastal access. Nearly three quarters of those surveyed (71%) indicated that the government should invest more in maintaining coastal and beach facilities. Nearly a third (32%) felt that more security should be provided at coastal access points. Of the thirty-six percent (36%) that identified "other" issues, some 16% felt more bathrooms were needed, another 11% wanted cleaner bathrooms, and 9% felt that additional regulations to improve security was needed. Additional investment in parking (13%) and increasing the number of coastal access signs (14%) were the other issues that were identified by more than 10% of those surveyed.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could impact the future provision of public access to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

Significant Changes in Public Access Management

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Statutes, regulations, policies, or case law interpreting these	Y	Y	N – although some increasing access issues
Operation/maintenance of existing facilities	Y	Y	N
Acquisition/enhancement programs	N	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

There are no significant public access management changes in Guam during this reporting cycle, however, the Public Access Report outlined in the previous subsections and planning efforts initiated by the previous 309 Assessment and Strategy Report are ongoing. Despite delays in planning efforts due to the GovGuam shutdown in response to COVID-19, the GCMP anticipates the Public Access Plan will be completed in March of 2021.

As the Public Access Report details:

> The GCMP's primary public access policy underscores "[t]he public's right of unrestricted access . . . to all non-federally owned beach areas and all Territorial recreation areas, parks, scenic overlooks, designated conservation areas and other public lands." In conjunction with other GCMP policies, this policy implements a set of strong legal authorities, including a requirement to "assure free access to the beaches of the territory to the maximum extent." The public is given unequivocal ownership of the land between the mean low and high waters, as well as ownership of any land between the mean low water and approximately 25 feet inland that may have been legally acquired through express or implied dedication, prescription, grant or other vesting mechanism. Another law gives the Territorial Seashore Protection Commission authority to regulate shoreline development to assure that access to the shoreline is increased to the maximum extent possible. Still a third statute seeks to protect traditional island accessways, and prevent the blocking of existing shoreline access. In addition to BSP, access policies are implemented by the

Departments of Land Management (DLM) and Public Works (DPW) through land use planning, zoning and building permit regulation; the Department of Parks and Recreation (DPR) with respect to shoreline parks and other public lands; the Department of Agriculture through controlled coastal marine preserves; and the Guam EPA, which manages an extensive beach water quality and monitoring program.

GCMP cannot accomplish public access management objectives alone. Ongoing interagency coordination supported by engaged stakeholders will be necessary to finalize and implement the Public Access Management Plan. BSP-GCMP will continue to support the completion of the management plan and will consider relevant planning elements for incorporation into Seashore Reserve Management Planning recommendations and other related planning updates as needed.

3. Indicate if your state or territory has a publicly available public access guide. How current is the publication and how frequently it is updated?

Publicly Available Access Guide

Public Access Guide	Printed	Online	Mobile App
State or territory has?	Y	N	N
Web address	N/A	N/A	N/A
Date of last update	2019 Commercial Guide updates (hiking & snorkeling / diving)	N/A	N/A
Frequency of update	N/A	N/A	N/A

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____

Medium X

Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Public access is a medium priority enhancement area due to the ease of public access for most recreational areas on the islands. In the 2020 Stakeholders Survey, respondents noted that challenges to public access include lack of enforcement regarding access to shoreline sites, particularly in remote coastal areas. Some comments indicated protecting public access to beaches should be a high priority. However, given that there were several higher ranked enhancement areas, and considering that GCMP is continuing to implement section 309 efforts to achieve program changes to support public access priorities from the prior 309 cycle, this enhancement area is being downgraded to “medium” priority for this reporting cycle.

Marine Debris

Section 309 Enhancement Objective: Reducing marine debris entering the nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris. §309(a)(4)

Resource Characterization:

1. In the table below, characterize the existing status and trends of marine debris in the state's coastal zone based on the best-available data.

Existing Status and Trends of Marine Debris in Coastal Zone

Source of Marine Debris	Significance of Source	Type of Impact	Change Since Last Assessment (↑, ↓, no change / unknn)
Beach/shore litter	H	Aesthetic, Resource damage, Health	↑
Land-based dumping	H	Aesthetic, Resource damage, Health	↑
Storm drains and runoff	H	Aesthetic, Resource damage, Health	↑
Land-based fishing (e.g., fishing line, gear)	M	Aesthetic, Resource damage, Health	No change
Ocean/Great Lakes-based fishing (e.g., derelict fishing gear)	L	Resource damage	No change
Derelict vessels	M	Resource damage	↑
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	L	Resource damage	No change
Hurricane/Storm	H	Aesthetic, Resource damage	No change
Tsunami	L	Aesthetic, Resource damage, Health	No change
Other: Unexploded Ordnance (UXO)	H	Health, Resource damage,	No change

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from marine debris in the coastal zone since the last assessment.

There are relatively few datasets and reports focused specifically on marine debris, however, there have been significant efforts over the past five years by the GCMP and GEPA as well as other partners to address marine debris. BSP-GCMP supports the annual "International Coastal Cleanup" and provides data on number of volunteers, amount of waste collected, and information on waste composition, however this only offers an annual snapshot reflecting marine debris trends.

International Coastal Cleanup (ICC)

As BSP's 2020 Press Release on the annual ICC details:

> The International Coastal Cleanup was founded by the Ocean Conservancy in 1986 and, for the past 35 years, has inspired millions of volunteers and industry players all over the world to take action by removing and recording trash during the event. Guam first joined in this worldwide effort on Oct. 14, 1995, with three sites — Ylig Bay, Agat shore, and Dungca's Beach — and only 450 volunteers. Guam is now participating in its 26th cleanup, an annual event that has grown tremendously since 1995, with over 29 sites and more than 5,000 volunteers collecting over 36,000 pounds of waste.[15]

The Ocean Conservancy collects ICC data annually as part of a global effort to characterize and address marine debris. Annual reports from the 2015 – 2019 cleanups show that number of people has been variable while the and total pounds of debris collected per person participating on average continued to increase over this past five-year reporting period.

	2015	**2016**	**2017**	**2018**	**2019**
Guam ICC Participants	4,134	5,651	5,398	1,373	4,607
Total Pounds Collected	21,167	23,420	36,397	9,642	100,048
Average pounds collected per participant	~5lbs	~4lbs	~6.7lbs	~7lbs	~20lbs
Annual report totals are included in international summary reports published after each cleanup. Source: Ocean Conservancy 2016, 2017, 2018, 2019, and 2020 ICC Annual reports, available at https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/annual-data-release/					

As the Ocean Conservancy's 2020 Annual Report details, 2019 was an important year for scientific research on marine debris at the global level, with numerous peer-reviewed studies documenting the prevalence of microplastics in water and soils, as well as identifying impacts of common marine debris materials of concern to coastal resources and the people that rely on these systems for food, income, and recreational use. These studies and identified impacts include:

- Choy et al.'s 2019 publication in Nature reported that microplastics were found floating in the deep sea and in the stomachs of the organisms living there;[16]
- Hernandez et al.'s 2019 report, *Plastic Teabags Release Billions of Microparticles and Nanoparticles into Tea*, concluded that microplastics and even smaller nanoplastics have been found in many of the food and beverage products we consume, finding that levels of nylon and polyethylene terephthalate particles released from the teabag packaging are several orders of magnitude higher than plastic loads previously reported in other foods;[17] and

[15] BSP, *Guam's annual islandwide coastal cleanup is scheduled for Sept. 19,* Pacific Daily News, July 7, 2020; https://www.guampdn.com/story/sponsor-story/bureau-of-statistics-and-plans/2020/07/07/guams-annual-islandwide-coastal-cleanup-scheduled-sept-19/5357252002/

[16] 2020 ICC Annual Report, *citing* C. Anela Choy, Bruce H. Robison, Tyler O. Gagne et al., *The vertical distribution and biological transport of marine microplastics across the epipelagic and mesopelagic water column,* Nature Scientific Reports, 06 June 2019.

[17] 2020 ICC Annual Report, *citing* Laura M. Hernandez, Elvis Genbo Xu, Hans C. E. Larsson, Rui Tahara, Vimal B. Maisuria, and Nathalie Tufenkji, *Plastic Teabags Release Billions of Microplastics and Nanoparticles into Tea,* Environmental Science & Technology 2019, *53 (21).*

- Kolomijeca et al.'s 2020 study indicated toxins from tire particles can reduce the survival rate of some fish hatchlings and cause deformities in the embryos, and suggested that these particles may become more toxic to organisms as water temperatures and turbulence from storm events increase with climate change.[18]

In addition to these publications, the 2019 Cox et al. report released by the American Chemical Society's Journal of Environmental Science and Technology made international headlines when, focusing on the American diet, they estimated that annual microplastics consumption ranges from 39,000 to 52,000 particles depending on age and sex based on food intake alone. These estimates increased to 74,000 and 121,000 when inhalation is considered. Additionally, individuals who meet their recommended water intake through only bottled sources may be ingesting an additional 90,000 microplastics annually, compared to 4,000 microplastics for those who consume only tap water.[19] This data resulted in shocking claim that the average person consumes about a credit card's worth of microplastics annually.

Similar concerns regarding microplastics were raised in the 2018-2019 National Geographic article "*Planet of Plastic?"* series. Highlights of this multi-year effort to raise awareness about the global plastic waste crisis included a June 2018 article that reported that between 1950 and today, approximately 9.2 billion tons of plastic have been produced, leading to numerous impacts to people and the planet.[20] Discussing plastic pollution on Guam for World Oceans Day in June of 2018, the Guam Daily Post highlighted local concerns about the "surge in microplastics" highlight by the National Geographic series and the growing data indicating that plastic pollution poses threats to people and our coastal resources.[21] That article linked plastic pollution to biodiversity and habitat protection concerns on Guam, referencing Department of Agriculture reports that a recent necropsy on a green sea turtle found pieces of plastic in its digestive system which had stopped the animal from eating. In addition to raising concerns about impacts to endangered species and habitats, the Guam Daily Post article went on to discuss concerns regarding impacts of plastic pollution to human health, voicing concerns about bioaccumulation. At minimum this press coverage and resulting policy actions indicate increasing awareness and concern about marine debris and plastic pollution to the coastal resources and coastal communities of Guam.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) for how marine debris is managed in the coastal zone.

[18] 2020 ICC Annual Report, *citing* Anna Kolomijeca, Joanne Parrott, Hufsa Khan, Kallie Shires, Stacey Clarence, Cheryl Sullivan, Leah Chibwe, David Sinton, and Chelsea M. Rochman, *Increased Temperature and Turbulence Alter the Effects of Leachates from Tire Particles on Fathead Minnow (Pimephales promelas),* Environmental Science & Technology 2020, *54 (3), 1750-1759.*
[19] Kieran D. Cox, Garth A. Covernton, Hailey L. Davies et al., *Human Consumption of Microplastics,* Environmental Science & Technology 2019, *53 (12), 7068-7074.*
[20] L. Parker, *Plastic of Planet? We Made Plastic. Now we depend on it. Now we're drowning in it.* National Geographic, June, 2018. Available at https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-waste-pollution-trash-crisis/
[21] M. Swartz, *Plastic in oceans a growing threat,* June 11, 2018, The Guam Daily Post. Available at https://www.postguam.com/news/local/plastic-in-oceans-a-growing-threat/article_eb935f06-69fe-11e8-b264-6f73371b46f3.html

Significant Changes in Marine Debris Management

Management Category	Employed by State/Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Marine debris statutes, regulations, policies, or case law interpreting these	Y	N	Y – Guam Plastic Bag Ban passed in 2018; Guam Litter Law citation booklets issued and trainings held in 2019
Marine debris removal programs	Y	N	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes and likely future outcomes of the changes.

Significant changes relative to marine debris management this assessment cycle include the 2018 adoption of a plastic bag ban, recent Guam Litter Law enforcement trainings, and ongoing marine debris management efforts in Cocos Lagoon and through the annual International Coastal Cleanup (ICC). None of these efforts are 309- or CZM-driven changes, however, GCMP leads the annual and has actively supported efforts to expand marine debris management laws and removal programs on Guam.

Guam Plastic Bag Ban and Litter Control Efforts

In part responding to growing concerns about plastic pollution, Senator Régine Biscoe Lee's Bill 268-34, which prohibits retailers and restaurants from distributing plastic carryout bags to consumers, was approved in 2018 as Public Law 34-110 and will take effect on January 1, 2021. As the Guam Daily Post reports, Senators voted 14-0 to ban the distribution of plastic carryout bags, an initiative that mirrors bans already passed in three other U.S. territories and the neighboring islands of Palau, the Marshall Islands, Yap and Fiji, as well as a growing list of states and countries.[22] Despite the strong mandated reflected by the unanimous Senate approval of the plastic bag ban legislation, some community members have voiced concerns that the ban doesn't go far enough. In a *Reader's Opinion* article to the Pacific Daily News, one community member suggested that changes in labeling may allow plastic bags qualify as "biodegradable" under Public Law 34-110 and suggested that the "best move now is to fight plastic pollution by refusing single-use items out of personal convenience and instead move toward reusable items."[23]

Litter law updates were included in the last 2015 309 Assessment and Strategy Report, and these efforts were bolstered when Guam Litter Law trainings were held and citation booklets were issued in 2019.

[22] The Guam Daily Post, *Breast cancer screening, plastic bag ban now law*, June 7, 2018, https://www.postguam.com/news/local/breast-cancer-screening-plastic-bag-ban-now-law/article_ba256ac6-6928-11e8-8799-cf4eaa72dc3b.html

[23] K. Dahilig, *Law banning plastic bags is seriously flawed*, February 23, 2020 Pacific Daily News, Readers Opinions; https://www.guampdn.com/story/opinion/readers/2020/02/23/law-banning-plastic-bags-seriously-flawed/4846988002/

Despite increasing interest in reducing land-based litter and controlling marine pollution, other reports indicate Guam's Mayors are resistant to issuing littering citations.[24]

Marine Debris Removal Programs

In 2019, the Guam Environmental Protection Agency (EPA) in partnership with the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR) were awarded a NOAA Marine Debris Program Removal grant to remove and dispose of approximately 2,500 tires within Cocos Lagoon.

2019 also marked the anniversary of Guam's 25th International Coastal Cleanup. The Guam Coastal Management Program facilitated the most recent ICC on September 19, 2020, and will continue to support these annual clean-up, public outreach, and waste classification efforts.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High _____

   Medium __X__

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Respondents identified interest in reducing marine debris in the 2020 Stakeholder Survey. In addition to interest in controlling litter, concerns were also voiced regarding "Beach/ Ocean cleaning of debris by public impacting marine biology and impacting ocean food resources". While increasing public engagement in the ICC and data showing increasing average increases in the amount of debris collected do not necessarily confirm observations that marine debris itself is increasing, public interest and efforts to address impacts of marine debris on Guam have been on the rise since Guam joined the ICC in 1995. Stakeholder survey responses for this 309 assessment as well as the 2019 Public Access Report indicate some concern with litter and potential impacts to coastal resources – although no stakeholder identified "Marine Debris" as a top priority, five of the 16 survey respondents listed marine debris as a "top 3" enhancement area. Coupled with increasing data indicating correlations between marine debris, plastic pollution, and impacts to environmental and human health, the prioritization of "marine debris" was increased from "low" to "medium" in this 309 Assessment and Strategy Report.

[24] H. E. Gilbert, *Mayors say trash citations 'waste of time', look to other options,* March 3, 2019, Pacific Daily News, https://www.guampdn.com/story/news/local/2019/03/02/illegal-dumping-citation-tickets-mayors-look-other-options-guam/2799593002/; see also *Voice of the People: Concerns over littering on Guam, malfunctioning street lights,* March 12, 2019, Pacific Daily News: Readers Opinion, https://www.guampdn.com/story/opinion/readers/2019/03/11/people-concern-litter-street-lights-guam/3136230002/

Cumulative and Secondary Impacts

Section 309 Enhancement Objective: Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources. §309(a)(5)

Resource Characterization:

1. Please indicate the change in population and housing units in the state's coastal counties between 2012 and 2017.

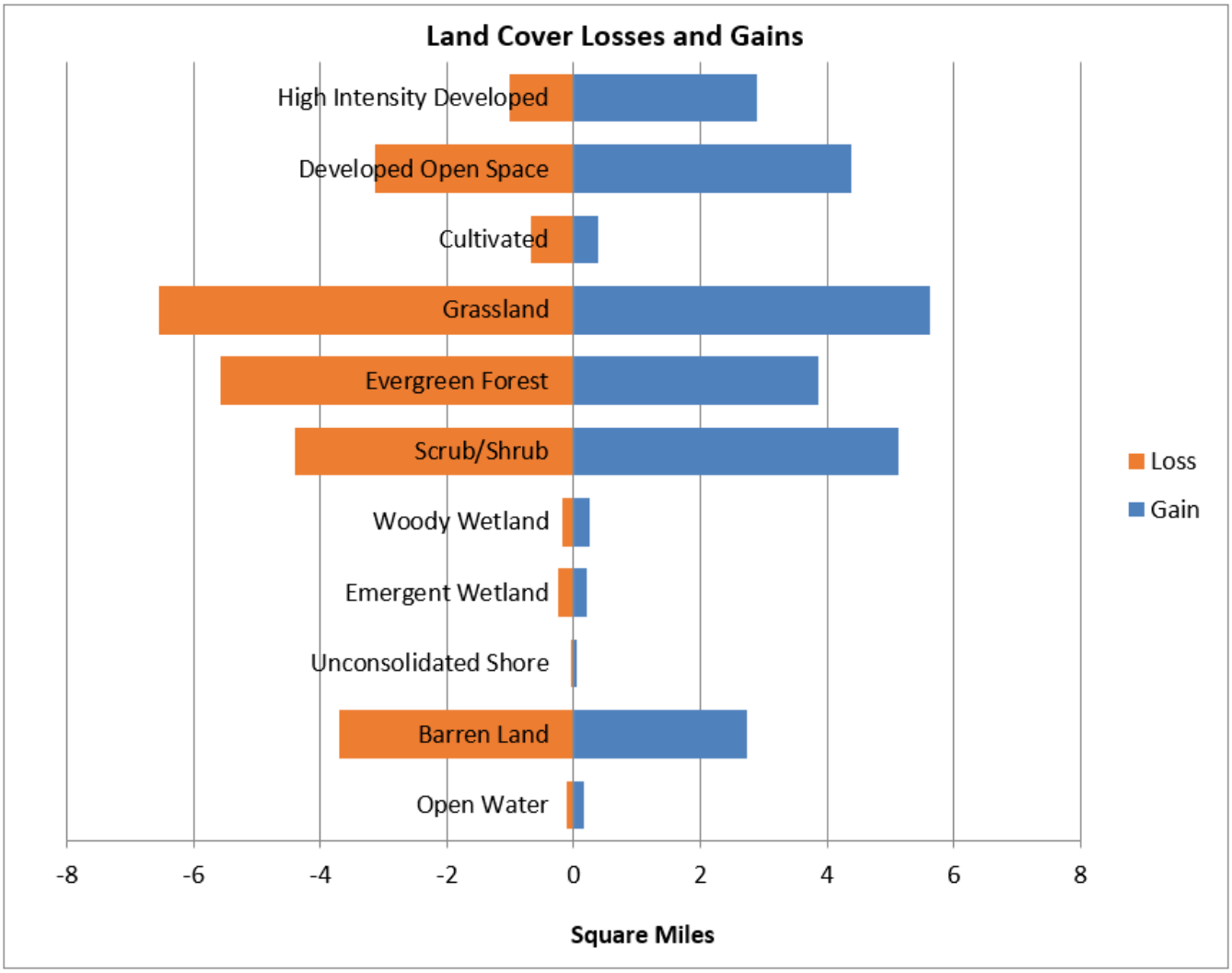
Trends in Coastal Population and Housing Units

	2000	2010	Percent Change (2000-2010)*
Number of people	154,895	159,358	2.9% increase since 2000
Number of occupied housing units	38,769	42,026	84% increase in occupied housing since 2000
*Based on 2000 and 2010 U.S. Census data			

2. Using provided reports from NOAA's Land Cover Atlas, please indicate the status and trends for various land uses in the state's coastal counties between 1996 and 2016.

Distribution of Land Cover Types in Coastal Counties

Land Cover Type	Land Area Coverage in 2016 (Square Miles)	Gain/Loss Since 2005*
Developed, Impervious Cover	21.07	+1.88 square miles / +9.77%
Developed, Open Space	23.56	+1.24 square miles / +5.56%
Grassland	40.34	-0.94 square miles / -2.28%
Scrub/Shrub	18.47	+0.73 square miles / +4.12%
Barren Land	5.24	-3.71 square miles / -15.75%
Open Water	20.4	+0.06 square miles / +0.28%
Agriculture	0.85	-0.35 square miles / -29.19% (But +0.05/+1050.91% Pasture / Hay)
Forested	93.4	-1.71 square miles / -1.80%
Woody Wetland	4.77	+0.07 square miles / +1.5%
Emergent Wetland	1.54	-0.03 square miles / -2.2%
*C-CAP data 2005 to 2016, NOAA-OCM. A chart visualizing these trends in land cover losses and gains from NOAA-OCM's C-CAP Change Template is included on the next page for further reference.		



3. Using provided reports from NOAA's Land Cover Atlas, please indicate the status and trends for developed areas in the state's coastal counties between 1996 and 2016 in the two tables below.

Development Status and Trends for Coastal Counties

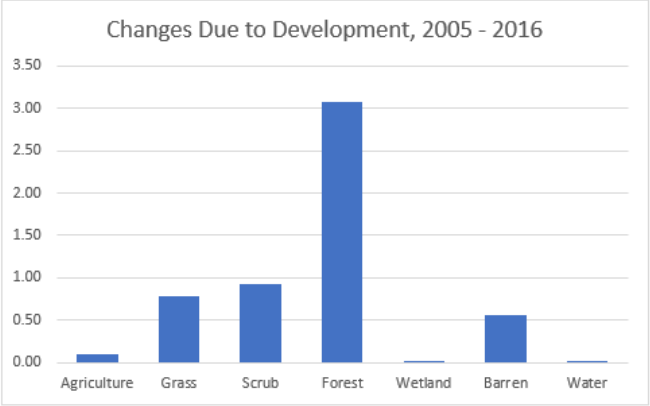
	2005*	**2016***	**Percent Net Change**
Percent land area developed impervious surface	18.1%	19.4	+1.4%
*C-CAP data from 2005 to 2016, NOAA-OCM			

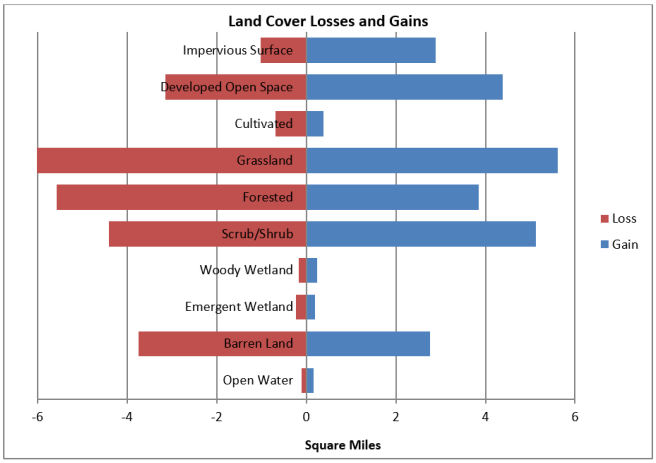
How Land Use Is Changing in Coastal Counties

Land Cover Type	Areas Lost to Development Between 2005*-2016
Barren Land	-2.0 square miles; +0.56 square miles changed to development
Emergent Wetland	Loss indicated but not attributed to "Development"
Woody Wetland	Gain indicated but not attributed to "Development"
Open Water	+0.01 square miles changed to development
Agriculture	+0.1 square miles changed to development (+1.85%)
Scrub/Shrub	+0.57 square miles changed to development
Grassland	+0.79 square miles changed to development (+14.38)
Forested	+3.07 square miles changed to development (+56.09%)
** Note: Islands likely have data for another time period and may only have one-time interval to report. If so, only report the change in land use for the time period for which high-resolution C-CAP data are available. Puerto Rico and the Northern Mariana Islands do not report.*	

Updated 2005 – 2016 C-CAP data indicates land cover changes across categories, including an overall change "to development" as outlined in the table above. Trends this reporting cycle reflect the conversion or loss of 3.07 square miles of forest and 0.03 square miles of emergent wetland attributed "due to development".[25]

Analysis of the land change table included below and supporting chart at right shows losses and gains across categories. These include overall net gains of 1.88 square miles of impervious surface cover, 1.24 square miles of developed open space, 0.73 square miles of scrub/shrub, and 0.5 square miles of open water.





C-CAP Level 1 Class Scheme	2005	Loss	Gain	2016	Net Change	Percent Change
Impervious Surface	19.20	-1.01	2.89	21.07	1.88	9.8%
Developed Open Space	22.31	-3.14	4.39	23.56	1.24	5.6%
Cultivated	1.20	-0.68	0.38	0.90	-0.30	-25.1%
Grassland	41.28	-6.55	5.61	40.34	-0.94	-2.3%
Forested	95.11	-5.57	3.86	93.40	-1.71	-1.8%
Scrub/Shrub	17.74	-4.40	5.13	18.47	0.73	4.1%
Woody Wetland	4.70	-0.17	0.25	4.77	0.07	1.5%
Emergent Wetland	1.58	-0.24	0.20	1.54	-0.03	-2.2%
Barren Land	6.41	-3.74	2.76	5.43	-0.98	-15.3%
Open Water	20.35	-0.11	0.16	20.40	0.05	0.3%

[25] C-CAP Analysis from NOAA Digital Coast, https://coast.noaa.gov/ccapatlas/report.html?sn=Guam

4. Briefly characterize how the coastal shoreline has changed in the past five years due to development, including potential changes to shoreline structures such as groins, bulkheads and other shoreline stabilization structures, and docks and piers. If available, include quantitative data that may be available from permitting databases or other resources about changes in shoreline structures.

Expansion of commercial development on the shoreline has increased since the 2015-2020 Assessment. As the 2018 Guam Statistical Yearbook reports, construction activity accounts for about nine percent of Guam's economy in terms of civilian employment and is considered a leading indicator of economic activities to come including employment. Despite a reported backlog of projects and labor shortages, the 2018 Statistical Yearbook indicated private development and military contracts were reported as "likely to increase" and listed numerous major projects that are listed as "ongoing". Additionally, numerous Government of Guam investment projects totaling approximately $201,800,000, including investments for the Department of Education, the Port Authority of Guam, the Department of Public Works, and the Guam Memorial Hospital Authority were identified for local funding initiatives.[26]

The 2018 Guam Statistical Yearbook indicates that the number of new construction permits decreased slightly between FY17 and FY18. In both years, the majority of new construction permits were concentrated in Tamuning/Tumon and Dededo, followed by Yigo and Mangilao.

Table 17-09 . Number of Permits Issued by Area and Type of Permit, Guam: Fiscal Year 2017

	Type of Permit								
Area	Total	Building	Government	Renewal	Demolition	Relocation	Grading	Sign	Miscellaneous
Total	1,294	447	55	4	58	0	60	84	586
Hagåtña	96	7	8	1	5	0	11	47	17
Agana Heights	26	11	0	0	1	0	0	0	14
Agat	26	12	1	0	1	0	4	0	8
Asan/Maina	27	7	1	0	2	0	1	0	16
Barrigada	73	30	2	0	1	0	8	0	32
Chalan Pago/Ordot	67	17	1	0	3	0	5	2	39
Dededo	221	94	13	1	6	0	5	5	97
Inarajan	17	4	2	0	0	0	3	0	8
Mangilao	124	59	5	0	6	0	2	1	51
Merizo	22	1	1	0	1	0	1	6	12
Mongomong/Toto/Maite	29	7	0	0	3	0	1	0	18
Piti	23	4	1	0	5	0	1	0	12
Santa Rita	44	25	6	0	0	0	0	0	13
Sinajana	28	12	1	0	1	0	2	0	12
Talofofo	36	23	0	0	0	0	1	0	12
Tamuning/Tumon	215	44	7	2	14	0	6	22	120
Umatac	3	0	1	0	0	0	0	0	2
Yigo	153	65	3	0	5	0	8	1	71
Yona	64	25	2	0	4	0	1	0	32
Total Permit Fees ($000) dollars	2,944								
Plan Checking Fee ($000) dollars	1,211	468	400	0	190	0	9	2	142
Permit Fees ($000) dollars	1,733	462	718	1	301	0	14	10	227
Total Construction Cost ($000) dollars	537,852	135,853	276,858	21	87,017	0	1,413	187	36,503

Source: Building Permits and Inspection Section, Department of Public Works, Government of Guam
Totals may vary slightly due to rounding.
Miscellaneous includes Renovations and Operating Permits

[26] 2018 Guam Statistical Yearbook, Bureau of Statistics and Planning, available at http://purl.org/spc/digilib/doc/o5r7x

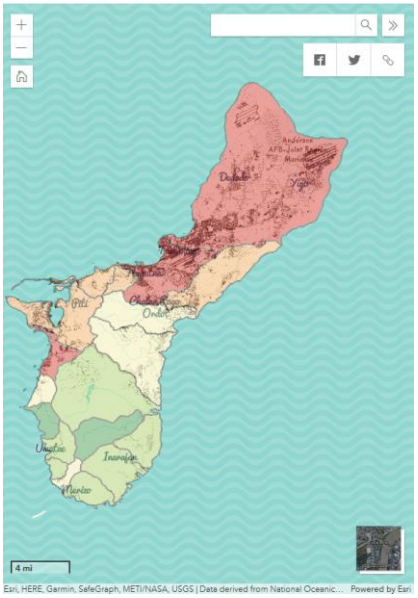
Table 17-07 . Number of Permits Issued by Area and Type of Permit, Guam: Fiscal Year 2018

Area	Total	Type of Permit							
		Building	Government	Renewal	Demolition	Relocation	Grading	Sign	Miscellaneous
Total	1,124	359	43	0	29	0	63	59	571
Hagåtña	40	5	4	0	4	0	1	4	22
Agana Heights	10	3	0	0	0	0	0	0	7
Agat	22	7	2	0	0	0	1	0	12
Asan/Maina	21	4	0	0	1	0	2	0	14
Barrigada	87	34	6	0	3	0	8	1	35
Chalan Pago/Ordot	48	20	1	0	0	0	5	1	21
Dededo	241	93	7	0	2	0	7	9	123
Inarajan	12	2	0	0	0	0	1	0	9
Mangilao	116	46	7	0	3	0	10	3	47
Merizo	3	0	0	0	0	0	1	0	2
Mongomong/Toto/Maite	28	7	0	0	2	0	2	2	15
Piti	12	2	2	0	1	0	0	0	7
Santa Rita	27	3	0	0	0	0	2	0	22
Sinajana	17	4	0	0	0	0	0	0	13
Talofofo	41	20	2	0	1	0	2	0	16
Tamuning/Tumon	213	31	10	0	9	0	6	39	118
Umatac	2	0	1	0	0	0	1	0	0
Yigo	124	64	0	0	2	0	10	0	48
Yona	60	14	1	0	1	0	4	0	40
Total Permit Fees ($000) dollars	2,097								
Plan Checking Fee ($000) dollars	707	295	127	0	4	0	15	6	260
Permit Fees ($000) dollars	1,390	518	290	0	8	0	24	25	525
Total Construction Cost ($000) dollars	365,428	134,357	145,554	0	695	0	2,345	474	82,003

Source: Building Permits and Inspection Section, Department of Public Works, Government of Guam
Totals may vary slightly due to rounding.
Miscellaneous includes Renovations and Operating Permits

5. Briefly summarize the results of any additional state- or territory-specific data or reports on the cumulative and secondary impacts of coastal growth and development, such as water quality, shoreline hardening, and habitat fragmentation, since the last assessment.

Water quality trends outlined in the 2018 Guam EPA 303(d) and 305(b) Water Quality Assessment Integrated Report are detailed at length in the "Wetlands" assessment section of this report. Because "turbidity" is a leading cause of water quality impairment, correlations are likely between development of impervious surfaces and identified concerns regarding CSI related to flooding and stormwater management remain pressing concerns. Public and agency concern regarding flooding and flood impacts have been increasingly documented in press coverage. Although comparison of 2005 and 2011 C-CAP data shows a 5.7% net change in impervious cover on Guam, that cover is not distributed evenly. The following tables outline change in impervious cover at the watershed level as visualized by WERI. This visualization tool, which incorporates 2016 C-CAP data, shows watersheds with greater than 14% impervious surface in red and provides watershed specific analysis. For example, in in the Northern Watershed, in 2005, impervious cover made up 12.84% of the watershed. By 2016, impervious surfaces increased to 14.24%, an increase of 628.8 acres since 2005. In the Agana watershed, impervious cover increased from 27.82% in 2005 to 29.31% in 2016.



Noting that "large increases to these types of surfaces can impact groundwater recharge, and possibly increase stormwater runoff", the WERI watershed viewer supports more detailed analysis of percent change and total acres of impervious acres for each watershed:

Watershed	IC 2005	IC 2016	% Change	IC Acres
Northern	12.84%	14.24%	1.40%	+628.8
Agana	27.82%	29.31%	1.49%	+129.7
Fonte	12.17%	12.89%	0.72%	+11.4
Piti-Asan	11.52%	12.22%	0.70%	+14
Apra	12.83%	13.63%	0.80%	+66.3
Agat	15.32%	15.73%	0.41%	+10.3
Taelayag	3.89%	4.16%	0.27%	+4.4
Cetti	0.92%	1.05%	0.13%	+2.6
Umatac	1.76%	1.85%	0.09%	+2.0
Toguan	2.19%	2.45%	0.26%	+2.4
Gues	4.44%	4.72%	0.28%	+3.2
Manell	1.46%	1.58%	0.12%	+3.8
Inarajan	1.50%	1.67%	0.17%	+9.6
Dandan	1.75%	2.62%	0.87%	+36.4
Ugum	0.13%	0.21%	0.08%	+4.3
Talofofo	1.80%	2.04%	0.24%	+36.0
Ylig	5.08%	5.65%	0.57%	+58.0
Pago	4.85%	5.68%	0.83%	+55.1
Mangilao	7.84%	9.22%	1.38%	+120.4
Source: WERI Watershed Viewer – Northern Guam and Southern Guam				

In total, this GIS analysis indicates an increase of impervious cover across all watersheds between 2005 and 2016.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state-level changes (positive or negative) in the development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources, since the last assessment.

Significant Changes in Management of Cumulative and Secondary Impacts of Development

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Statutes, regulations, policies, or case law interpreting these	N	N	N
Guidance documents	Y	N	Y – 2017 update to GEPA Stormwater Management Guidance
Management plans (including SAMPs)	Y	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

As noted in discussion of the wetlands enhancement area, while no significant changes in management programs have occurred, GEPA did update their water quality standards in 2015 and issued a revised erosion and sediment control field guide in 2017 that aims to help contractors meet the requirements of Guam's National Pollution Discharge Elimination System and Water Quality Standards and the 2006 CNMI/Guam Stormwater Management Manual (22 GAR-2-Chapter 10). This project was supported by funding provided by the NOAA Coral Reef Conservation Program, U.S. Department of Interior, and U.S. EPA. The best practices outlined in the guide aim to reduce risk of development impacts to wetlands and coastal habitats.

Additionally, ongoing interagency planning efforts have been aimed at identifying and addressing flooding and stormwater concerns. The Guam Silver Jackets team was formalized through a charter as a result of key coordination from the Guam Coastal Management Program and the US Army Corps of Engineers Honolulu District. This charter serves as a catalyst in developing comprehensive and sustainable solutions to Guam's hazard issues, including mitigation planning, flood hazard mapping, risk reduction activities, response and recovery planning, community resilience, and climate change adaptation in the Territory of Guam. The Silver Jackets team will be focusing on policy changes that

focus on improving subdivision and development requirements for individual home owners, incentivizing low impact development standards, establishing design criteria for retaining walls, and addressing flood prevention, and post construction flood enforcement.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High __X__

   Medium _____

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Given continued stakeholder concerns and increasing development pressures that are likely to exacerbate cumulative and secondary impacts to coastal resources, the prioritization for this enhancement area is maintained as "high" for this report and planning cycle. Similar to the last reporting cycle, during meetings with stakeholders, many continued to express a high degree of concern about flooding and coordination challenges regarding flooding and stormwater management. Understanding the impacts of increased development, and more specifically the associated higher volumes of stormwater, has become a priority due to growing economic, social and environmental effects. Although limited efforts have been made to educate the construction community to develop effective post-construction best management practices (BMPs) to address storm water and erosion impacts, little has been done to improve or enforce existing pre and post construction storm water management regulations. Stakeholders were interested in developing education programs on the existing stormwater regulations and their relationship to the local economy and the natural environment. Stakeholders also identified associated concerns with impacts from development on steep slopes and near fragile ecosystems that could be further addressed through coordinated planning and development guidance through efforts focused on this enhancement area.

Special Area Management Planning

Section 309 Enhancement Objective: Preparing and implementing special area management plans for important coastal areas. §309(a)(6)

The Coastal Zone Management Act defines a special area management plan (SAMP) as "a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone. In addition, SAMPs provide for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making."

Resource Characterization:

1. In the table below, identify geographic areas in the coastal zone subject to use conflicts that may be able to be addressed through a SAMP. This can include areas that are already covered by a SAMP but where new issues or conflicts have emerged that are not addressed through the current SAMP.

Geographic Area	Opportunities for New or Updated Special Area Management Plans
MPAs, High-value reefs	Major issues include overharvesting, near-shore development, increased recreation, poor fishing practices, storms, shoreline erosion, flooding, non-point pollution. Management opportunities include the development and adoption of a Seashore Protection Plan which has been authorized since 1974 but has never been produced. Latest benthic habitat maps were done in 2004 so opportunity to update that to support identification and management at MPAs / High values reefs
N. Guam aquifer recharge area	Major issues include agriculture, development, overuse, military build-up, illegal dumping; plans that are not incorporated into the Guam Comprehensive Development Plan and therefore BSP-GCMP does not have specific enforcement authorities for stand-alone planning efforts. Management opportunities for southern Guam include the development and adoption of a Guam Forests System Plan. Northern Guam could include updating and adopting the 2009 North and Central Guam Land Use Plan. Comprehensive Development Plan guides all development so updates should be incorporated and leveraged to become special area management plans to support establishment of enforceable policies
Fragile Areas (wetlands, limestone forest, wildlife habitats and historic sites)	Major issues include development, Military, Ancestral Lands and Chamorro Land Trust needs, water sports and tropical beach recreation, and outright vandalism, graffiti and theft of historic properties in historic sites. Management opportunities include the development and adoption of a Seashore Protection Plan and a Guam Forests System Plan. Stakeholders also noted opportunities to update the Guam Wetlands Management Plan and other resource-specific conservation planning efforts focused on specific endangered species habitats as well as high risk areas such as fire-prone grass lands and steep slopes that are at high risk of erosion and landslides, especially when coupled with fire and storm events.

Geographic Area	Opportunities for New or Updated Special Area Management Plans
Priority Southern watershed management areas (Piti- Asan, Manell-Geus, Pago Bay, Ugum, Fouha,Toguan)	Major issues include fires, poor land management, increasing development, flooding, invasive species. Management opportunities include the development and adoption of a Southern Development Master Plan.

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of SAMPs since the last assessment.

WERI and the Northern Guam Lens Aquifer

The University of Guam's Water and Environmental Research Institute (WERI) has been supporting annual monitoring efforts specific to the Northern Guam Lens Aquifer and supports ongoing research. This research and resulting publications are regularly updated on the Guam Hydrologic Survey (GHS) website, https://guamhydrologicsurvey.uog.edu/.

The Guam Hydrologic Survey was created by Public Law 24-237 in 1998, which aimed to establish a permanent program for collecting, consolidating, and storing all of the water resource data on Guam. Numerous WERI publications specific to the Northern Guam Lens Aquifer and sustainable watershed management were published since the last assessment.[27] Highlights of recently completed projects and reports include:

- **Visualization of Salinity Patterns and Trends in the Northern Guam Lens Aquifer**[28]
  This project focused on processing, visualization and analysis of the patterns and trends of salinity from drinking wells in the Northern Guam Lens Aquifers (NGLA). Water quality data was available from Guam Waterworks Authority and GIS was utilized to process and analyze salinity data, and therefore locate wells with water quality problems with salinity. Based on the analysis of the salinity data, and visualization of the locations of the wells with salinity problems, conclusion can be made that most of well with salinity problems are located in Hagatna Basin and Yigo-Tumon Basin, and many located in Finegayan Basin though it is a small basin. Only Well M-9 located in Mangilao Basin was monitored with salinity problem. Data analysis also determined that salinity levels increased between 2001 and 2009.

- **Yigo-Tumon Basin Production Well Capacity Simulation**[29]
  In this study a numerical groundwater model of the Northern Guam Lens Aquifer was used to evaluate the potential capacity of the freshwater lens. The simulation modeled 130 vertical wells within the parabasal zone, the portion of the freshwater lens that is supported by volcanic basement rather than seawater, in successive average pumping scenarios ranging from 100 gallons per minute (gpm) to 500gpm. Simulation results indicate that up to 89 million gallons per day can be extracted from the aquifer while maintaining the production weighted average chloride concentration at 250 mg/L, the safe drinking water guideline established by GEPA.

[27] A full list of WERI publications and reports is available at https://weri.uog.edu/reports-and-publications/.
[28] Simard, C., J.W. Jenson, M.A. Lander et al., *Visualization of Salinity Patterns and Trends in the Northern Guam Lens Aquifer with online data appendix*, University of Guam Water and Environmental Research Institute Technical Report 143, April 2015.
[29] Superales, D.V.G., N.C. Habana, J.W. Jenson, *Defining and Evaluating Production Capacity for the Northern Guam Lens Aquifer*, University of Guam Water and Environmental Research Institute Technical Report 170, Dec. 2019.

These results further suggest there are advantages to focusing development of carbonate island karst aquifer on the parabasal zone.

- **PFOS Trend Monitoring in a Guam Drinking Water Production Well: Seasonal Influences**[30]
  In 2009, US EPA issued a provisional drinking water health advisory for perfluorooctane sulfonate (PFOS) and Guam Waterworks Authority began monitoring for PFOS in 2015. Five production wells were identified as PFOS contaminated and levels in two of them were consistently above the USEPA's 70 nanogram (ng)/L benchmark which was promulgated on May 25, 2016. Both wells that were identified as PFOS contaminated were taken off line and may be retrofitted with granular activated carbon filters in the future, however, WERI continued to monitor and assess sampling at well A-25. Results of this study show a strong positive correlation between PFOS concentrations in well A-25 and monthly rainfall averaged over the three months prior to each sampling event. The delayed relationship observed between these two variables implies that the source(s) of PFOS contaminating A-25 may be located some considerable distance away from the well-head.

- **Guam Waterworks Authority Production-Well Rehabilitation Assessment: Lessons Learned / Manual for Well Exploration and Development**[31]
  Guam Waterworks Authority (GWA) produces 90% of the 45 MGD potable water from its main source, the Northern Guam Lens Aquifer (NGLA). GWA is currently managing 120 deep vertical production wells in this aquifer to meet the demand. However, many of these production wells are deteriorating from age with more than 40 years in operation, thus lifespan exceeded, maintenance is no longer economically viable, and production has become unsustainable. During the first project year (June 2018 – June 2019), main reasons why production wells had been shut down were analyzed based on the analysis of GWA production well data including 20 inactive wells. Main reasons why production wells had been shut down caused by an aging issue are classified as collapsed well casing, collapsed well screen and pump stuck in well casing. Four production wells have been taken offline due to exceeding maximum contaminant levels (MCL) of chlordane, tetrachloroethylene (PCE) and health advisory levels of perfluorooctanesulfonic acid (PFOS) regulated by US EPA. Understanding these management challenges can support GWA's efforts to achieve sustainable water resource management outcomes.

Other Agency- and Resource-Specific Assessments and Reports

Several agency- and resource-specific assessments and reports are underway. These, in addition to watershed management plans that are in various stages of development, are not currently incorporated into the Guam Comprehensive Development Plan and are therefore considered to be more like guidance documents than enforceable planning elements. Therefore, updates relevant to priority coral reefs and watersheds are also included here.

[30] Denton, G.R.W., C.M. Sian Denton, Y.S. Kim, et al., Perfluorooctane Sulfonate (PFOS): A Contaminant of Emerging Concern in Guam's Groundwater (Project Synopsis Report), The IRES - 415 International Conference on Engineering and Natural Sciences, (ICENS) , June 29-30, 2018, Beijing, China, *in* Water and Environmental Research Institute of the Western Pacific Annual Technical Report, FY2017.
[31] Kim, Y., N. Habana, and J. Jenson, Guam Waterworks Authority (GWA) Production-Well Rehabilitation Assessment: Lessons Learned / Manual for Well Exploration and Development, 2019, USGS State Water Resources Research Program.

- **Guam Coral Reef Resilience Strategy (GRRS), BSP, 2019**[32]
  The Guam Coral Reef Resilience Strategy (GRRS) was developed collaboratively by the Guam Coral Reef Initiative, which includes partners from local and federal agencies, research institutions, non-profit organizations, and the private sector. The goal of the GRRS is to enhance the resilience of Guam's coral reef ecosystems and human communities to the impacts of climate change by 2025. The GRRS is a tool for adaptive, strategic management; an opportunity to engage and inform key stakeholders; a mechanism to increase effectiveness of coral reef management; and a guide for funding projects designed to reach a common goal. The GRRS is intended to be a living document and thus frequently updated. The GRRS replaces the Guam Coral Reef Local Action Strategies (LAS) and Guam's Coral Reef Management Priorities for 2010-2015, the latter developed cooperatively by the Territory of Guam and the NOAA Coral Reef Conservation Program (CRCP). The Guam Reef Resilience Strategy will primarily be used by managers to guide coral reef management and conservation activities and provide justification for grant proposals and other funding requests.

  Key findings relevant to coral reefs and coastal resources management include:
  - In 2016, over 1.5 million visitors came to Guam and spent over $1.5 billion on the island (GVB 2017). This represents an almost 25% increase in annual visitor arrivals since 2007 (GVB 2011). According to exit surveys, over 30% of Guam's visitors cite the marine environment as a top reason for visiting the island (GVB 2018). Given this increase in visitor arrivals and spending, and the importance of Guam's coral reef and associated activities for the tourism industry (snorkeling, diving, etc.), the economic value of Guam's reefs has presumably increased in the last decade, although there has not been a formal assessment since 2007. The Nature Conservancy's Atlas of Ocean Wealth appraised Guam's coral reefs as providing $323M USD per year (Spalding et al., 2016).

  - Land-based sources of pollution (LBSP) includes illegal dumping and runoff of storm water, waste water, fertilizers, and sediment from construction sites; erosion due to fires and recreational off-roading; and urban areas dominated by impervious surfaces. The main pollutants that impact Guam's nearshore waters and beaches are hydrocarbons, microbes, and sediment. Sedimentation, caused by severe upland erosion, is one of the greatest threats to Guam's coral reef ecosystems.

    - In northern Guam, LBSP are discharged through freshwater seeps linked to drainage basins, stormwater outfalls, and the Northern District Wastewater Treatment Plant outfall. These impacts have been documented in Agana Bay and Tumon Bay. Although the shoreline surrounding the Tumon Bay Marine Preserve is highly developed, there is no comprehensive storm water management plan for the area. Construction of new hotels and practices by existing hotels (e.g. heavy fertilizer use) are likely impacting water quality and coral reef health in Tumon Bay, the island's tourist center. In Apra Harbor,

[32] BSP-GCMP, Guam Coral Reef Resilience Strategy, December 2018, available at http://guamcoralreefs.com/sites/default/files/guam_coral_reef_resilience_strategy_final_december_2018_0.pdf

developments by the US Navy and Port Authority of Guam may be affecting water quality and reef communities.

- Sedimentation and decreased water quality from runoff and freshwater inputs are especially concerning for reefs along Guam's southwestern coast. Towed diver surveys conducted by NOAA in 2005 found that coral cover was over 50% higher on northeastern, northwestern, and southeastern reefs compared to reefs in the southwest.

- **Long-term Coral Reef Monitoring Program and Interim Report**[33]

  Led by the UoG Marine Laboratory with support from the NOAA Coral Reef Conservation Program, the Comprehensive Long-term Coral Reef Monitoring at Permanent Sites on Guam project, also known as the Guam Long-term Coral Reef Monitoring Program (GLTMP) has been collecting survey data at high priority reef sites since 2010. As detailed in the *Interim Report of the Comprehensive Long-term Coral Reef Monitoring at Permanent Sites on Guam project*, (Interim Report) published in December, 2018, high priority reef areas targeted for monitoring by the program include the Tumon Bay Marine Preserve, East Agana Bay, the Piti Bomb Holes Marine Preserve, the Achang Reef Flat Marine Preserve, Cocos-East, Fouha Bay, and Western Shoals, in Apra Harbor. However, the significant bleaching-associated impacts observed at shallow reef areas in recent years, and the results of preliminary analyses that suggested only minor changes in benthic cover at the deeper high priority reef areas, necessitated the prioritization of the analysis of the copious coral bleaching survey data collected at shallow seaward slope and reef flat survey sites located around the island. The Interim Report included summaries of GLTMP activities as well as results of data analysis.

  Key observations include:

  - 32% decline in living coral on shallow seaward slopes island-wide, and 59% decline in living coral on shallow seaward slopes along Guam's east coast between 2013-2017;
  - 36% decline in extent of living staghorn coral island wide 2013-2017; and
  - 37% decline in living coral at reef flat sites along Guam's west coast 2009-2018.

  Thermal stress conditions in 2017 were more severe than the record-breaking conditions of 2013, with satellite-derived and buoy temperatures both exceeding 31°C in August and accumulated heat stress reaching 13 DHW in mid-October. Maximum water temperatures of between 34°C and 35°C were recorded from reef flat sites in Tumon Bay and Agat between June and August.

  In discussing adaptive management planning, the Interim Report notes that the frequency and severity of the bleaching events and the associated major changes in benthic communities at sites around the island has necessitated a re-evaluation of GLTMP priorities. As described in a proposal for continued funding recently submitted to the NOAA Coral Reef Conservation Program, by conducting the full suite of benthic surveys at only permanent sampling stations,

[33] Burdick, D., and L. Raymundo, *Interim Report of the Guam Long-term Coral Reef Monitoring Program*, December 2018, University of Guam Marine Laboratory, available at http://guamcoralreefs.com/sites/default/files/guam_ltmp_na15_interimreport_final_v2_23jan2019.pdf.

reducing the frequency of coral quadrat surveys, and using the CoralNet website for the first-pass analysis of images from the seaward slope terrace sites, the GLTMP team can free up the capacity necessary to establish permanent transects in the more dynamic reef front zone of the high priority reef areas, make permanent 16 of the island-wide bleaching response/recovery sites, and monitor benthic cover at these new sites on an annual or biennial basis.

The GLTMP team also participated in the development of NOAA's Guam Coral Reef Status Report which is detailed further in the Ocean Resources section of this assessment, and supports ongoing monitoring and analysis as well as community education and outreach such as the Guam Community Coral Reef Monitoring Program.

Priority Watershed Management Plans – Status and Recent Reports

Manell-Geus and Piti-Asan watershed management plans were completed during previous assessment. Work to address threats in the watershed continues. Most watershed work is performed by GCMP staff in support of coral funded projects. NOAA is also coordinating with local and federal partners to undertake extensive watershed management actions in support of Manell-Geus as a coral priority site and a NOAA Habitat Blueprint focus area. In July, 2019, NOAA announced funding for habitat restoration and conservation planning efforts focused on the Manell-Geus watershed. This project will provide training in watershed and reef restoration techniques, obtaining restoration materials, and coordination of implementation of community restoration projects in order to build capacity for coral reef conservation and management.[34]

- Manell-Geus Watershed Reports include:
    - **2015 Assessment of Turbidity in the Geus River Watershed in Southern Guam**[35]
      This study was funded by NOAA through the University of Guam Water and Environmental Research Institute (WERI) via the Guam Bureau of Statistics and Plans, Guam Coastal Management Program. The study assessed baseline hydrologic conditions of the Geus Watershed through field observations and hydrologic data collected from December 2013 to January 2015. Results show a strong correlation between stream level, turbidity, and rainfall within the watershed, suggesting the watershed is highly dynamic. A synthesis of the information in this watershed study allows for recommendations of effective watershed management strategies and opens the way for evaluating progress within the Geus Watershed with continued monitoring.
    - **2017 Manell/Geus Watershed Restoration: Final Report**[36]
      This study assessed the physical characterization of the stream channel and conduced riparian vegetation and macrofaunal surveys to improve water budget analysis and support identification of flooding and habitat degradation risks.

[34] NOAA Fisheries Press Release: $950,000 in Funding for NOAA's Habitat Focus Areas, July 18, 2019, https://www.fisheries.noaa.gov/feature-story/950000-funding-noaas-habitat-focus-areas
[35] Khosrowpanah, S., M. Kander, J. Rouse, and B. Whitman, *Assessment of Turbidity in the Geus River Watershed in Southern Guam,* June 2015, University of Guam Water and Environmental Research Institute of the Western Pacific, Technical Report 156.
[36] Waddel, J., J. Calaor, K., Hutcherson et al., *Manell/Geus Watershed Restoration: Final Report*, 2017, available at https://repository.library.noaa.gov/view/noaa/15437

- **2020 USACE Comprehensive Flood Study –** While discussed in-depth in the Coastal Hazards section, flood inundation models for Umatac and Manell rivers are also relevant to ongoing Manell-Geus watershed management efforts, and are detailed further here.

  Flood Hazard Study – Nelasa (Manell) River: Models of the Manell river system suggest that the hardened and narrow channel, short overbanks, and structural constrictions along both the principal and tributary rivers result in floodwaters entering the overbank areas and residential properties as frequently as the 50% Annual Exceedance Probability (AEP) (2-yr) event. Frequent fires in the watershed have resulted in the native ravine forest being replaced with the more resilient and fire-adapted savannah grass. In the short term, the savannah grass may be helping to reduce overland flow and sediment runoff by providing immediate cover to otherwise bare soil. However, with each fire, the organic component of the soil is eroded and the ability for any type of vegetation to maintain its existence is lost, resulting in "badland" areas of bare soil. Even the savannah grasses would be unable to grow in these badland areas. The USACE report concludes that the long-term effects from burning and the creation of badlands are a real threat in terms of flood risk. Assessed flood mitigation alternatives specific to this site include reforestation, restoring the natural flow path, and an upper detention basin.

  Flood Hazard Study – Umatac River - Calibrated models indicate that on the Umatac river system, the narrow channel, short overbanks, and structure constructions along both the principal and tributary rivers result in floodwaters entering the overbank areas and residential properties as frequently as the 50% AEP (2-year) event. Based on typical sediment levels observed during the October 2018 site visit, the Umatac Bridge would be able to pass the 50% AEP (2 year) flood event with marginal flooding upstream and downstream to residential properties. During the 20% AEP (5 year) event, residential properties upstream and downstream of the bridge would begin flooding a reasonable amount. The bridge itself would overtop during the 1% AEP (100 year) event. Noting fires also compound flooding risks in this system, assessed flood mitigation alternatives specific to this site include reforestation, pre-storm cleaning, and an inline weir and detention basin structure. This analysis and the resulting flood hazard map, included for reference in the Coastal Hazards assessment section, will support ongoing watershed management planning dialogs.

- Piti-Asan updates include the FY18 award from the U.S. Department of the Interior to BSP under the Coral Reef and Natural Resources initiative that will in part support the geotechnical investigation of rainfall-induced landslides in the Piti-Asan watershed. This forthcoming analysis will support improved modeling and management of major causes in the watershed.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could help prepare and implement SAMPs in the coastal zone.

Significant Changes in Special Area Management Planning

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
SAMP policies, or case law interpreting these	Y	Y	Y
SAMP plans	Y	Y	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:

    a. Describe the significance of the changes;

    b. Specify if they were 309 or other CZM-driven changes; and

    c. Characterize the outcomes or likely future outcomes of the changes.

Although not 309 or CZM-driven, ongoing planning updates include the "Imagine Guam" plan and the recently adopted "Guam Green Growth Initiative", which includes numerous area-specific management objectives and action items, as well as several adopted bills and one set of three critical pending actions relevant to the implementation status of the Guam Forest Legacy Act of 2012.

- **Imagine Guam**
  The "Imagine Guam" initiative reflects a strategic visioning process launched in 2015 that aims to provide a road map for development for the next 50 years. Although this effort resulted in the creation of a Land Use Master Plan and Capital Improvements Master Plan, these planning elements have not been funded.

- **Guam Green Growth**
  In September, 2019, Governor Lou Leon Guerrero issued an Executive Order 2019-23 directing GovGuam agencies to support the UoG's Center for Island Sustainability in the development of a 10-year sustainability plan. The Guam Green Growth (G3) initiative officially launched in January, 2020. The G3 Working Group, which is made up of more than 80 members form the public and private sectors, developed an "Action Framework" to further 17 sustainable development goals. Despite the GovGuam shutdown, the G3 Working Group was able to continue the development of objectives and action items, and the 10-year Action Framework was signed on September 23, 2020, launching efforts to develop and implement tangible solutions to sustainability challenges and contribute to a green economy for the island region.[37]

  Action Framework goals and objectives that may be relevant to SAMP include: supporting sustainable food systems including investing in community gardens for every

[37] UoG Center for Island Sustainability, Guam Green Growth, https://www.uog.edu/center-for-island-sustainability/guam-green-growth

village; encouraging sustainable operations by encouraging energy and water savings programs in the hotel district; facilitating sustainability in the built environment by updating flood hazard and coastal storm surge maps and working with government agencies, utilities, and the private sector to develop a plan to relocate critical infrastructure from flood-prone areas to higher elevated areas; expansion of public transportation services including building "Park and Rides" and transfer stations to plan and design safe, clean, accessible, and environmentally friendly transportation systems; effectively management Guam's surface and groundwater including implementing BMPs for wellhead protection, increasing areas of managed forests, decreasing fire occurrence, protecting "high valued forest and marine areas", and engaging mayors of the southern villages to support BSP in the completion of a Southern Development Master Plan.

As outlined in the Guam Coral Reef Resilience Strategy, several laws that were passed since the last assessment period relate to special resource and area management planning. These include:

- **Public Law (PL) 33-144, 2016 – Guam Ocean and Fisheries Conservation Act of 2015**
  This law establishes the Guam Ocean and Fisheries Management Council composed of nine voting members appointed by the Governor to coordinate and promote activities related to the conservation and development of Guam's ocean, fisheries, and marine resources, including implementation of PL 29-127, development of permit requirements for fishing, and advising the Governor and Legislature. The law also establishes the Guam Ocean and Fisheries Conservation and Development Fund for boating access, research, pollution mitigation, cultural preservation, and other related activities. As of mid-2018, the Council members have not been appointed and the Council has not been convened.

- **PL 33-159, 2016 – Establishment of the Southern River Erosion Council and mandate for master plans to address erosion in southern Guam**
  This law acknowledges that erosion threatens to diminish both public and private lands, impact jobs in the agricultural and tourism sectors, decrease water quality, deter navigation of rivers, and damage nearshore benthic ecosystems. This law establishes the Southern River Erosion Council to identify erosion issues and recommend mitigation strategies to address erosion along rivers in southern Guam. The Council includes representatives from DoAg, UOG, BSP, GWA, GEPA, DPW, DLM, US Department of Agriculture (USDA), US Army Corps of Engineers, private landowners, and mayors of the seven southern villages (Agat, Umatac, Inarajan, Santa Rita, Talofofo, Merizo, and Yona). This law also mandates the development of a comprehensive master plan(s) for southern Guam to identify and mitigate erosion problems according to the recommendations of the Southern River Erosion Council. However, as of mid-2018, the Council has not been convened and the master plan(s) have not been developed.

- **PL 34-72, 2018 – Marine Conservation Act of 2018**
  Detailed further in the "Aquaculture" enhancement area assessment, PL 34-72 aims to support a participatory community-based fisheries management approach is necessary to properly manage and conserve these resources. Relevant to SAMP, the resulting 2020 Marine Conservation Plan identifies area-specific investment priorities including improving the Agat Mariana, one of only two public small-boat marinas which support Guam's estimated 800+ boaters, and increased

deployment of fish aggregating devices (FADs) to improve catches of pelagic fish in high-value fisheries management areas.

Guam Forest Legacy Act – Legislation Pending

Necessary SAMP-relevant legislative action has been pending to support the implementation of the Guam Forest Legacy Act. On February 18, 2020, Senators Clynton E. Ridgell and Sabina Flores Perez introduced three bills to effectuate elements of the Guam Forest System Plan enacted under the Guam Forestry Legacy Act of 2012. Working closely with the Department of Agriculture, the Department of Land Management, and the Bureau of Statistics and Plans, Senators Ridgell and Perez identified nearly two thousand acres of government of Guam land for the protection of natural resources and habitats. These measures are the first time that land is being proposed for inclusion to the Guam Forest System inventory that was created over eight years ago. Senator Ridgell introduced Bills 291-35 and 292-35, authorizing the Department of Agriculture and its Forestry Division full jurisdiction of government of Guam land in Merizo, Inarajan, Talofofo, and Umatac where there is already an active effort for planting native trees for soil enrichment and erosion control. Senator Perez's Bill 293-35 seeks to add the Pågat Cave Site in Yigu to the Forest System Plan for the conservation of the limestone forest up north.[38] Senatorial records indicate Bills 291-35 and 292-35 were referred to committee on March 5, 2020, and Bill 293-35 was referred to committee on March 30, 2020, with no further actions reported as of the drafting of this assessment.[39]

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High _X__

   Medium _____

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

In addition to stakeholder feedback which identified SAMP as a leading enhancement area priority, there is a confluence of government mandates and ongoing planning efforts that aim to address area- and resource-specific management objectives. GCMP has continued to support research and management planning efforts that qualify as SAMP, including focus on coral reefs, fragile areas, and priority watersheds. Although only three of 16 survey respondents identified SAMP as their top priority, eight respondents ranked SAMP in their "top three" priority enhancement areas. Moreover, comments highlighted numerous geographically specific management considerations for "conservation areas", "wetland areas", "watershed management", "flood-prone" and "risk-prone areas with highly vulnerable populations" that could appropriately be addressed through targeted SAMP-focused management efforts.

[38] *Press Release: Bills seek to protect 2,000 acres of forests and watersheds,* February 18, 2020, Pacific News Center, https://www.pncguam.com/bills-seek-to-protect-2000-acres-of-guam-forests-and-watersheds/

[39] 35th Guam Legislature – Bills, available at http://guamlegislature.com/index/bills/

SAMP-relevant comments that were submitted in response to the question "What would a successful 5-year outcome for your Priority 1 enhancement area look like to you" included:

- Sustainable development goals for coastal areas, and protect a certain percentage of the coastal areas protected (via master-plan);
- Flooding and hazard management plans are in place that include consideration of and investment in nature-based solutions for priority watersheds and high risk areas;
- Consistent successful enforcement for Public Access to remote coastal areas; and
- Planning is optimized and contributing to finding solutions through the proper management of SAMPS.

Follow-up interviews with the GCMP confirmed that Special Area Management Planning is a high priority assessment area that warrants a Phase II assessment to support further discussions regarding if and how this management tool can support program changes and improved outcomes for Guam's coastal resources.

Ocean and Great Lakes Resources

Section 309 Enhancement Objective: Planning for the use of ocean … resources. §309(a)(7)

Resource Characterization:

1. Understanding the ocean and Great Lakes economy can help improve management of the resources it depends on. Indicate the status of the ocean and Great Lakes economy as of 2015 (the most recent data) in the tables below. Include graphs and figures, as appropriate, to help illustrate the information.

Status of Ocean and Great Lakes Economy for Coastal Counties (2011-2015)

	All Ocean Sectors	**Living Resources**	**Marine Construction**	**Ship & Boat Building**	**Marine Transportation**	**Offshore Mineral Extraction**	**Tourism & Recreation**
Employment (# of Jobs)[1]	19,592 – 21,364	112-218	554-703	20-118	1,195-1,539	0-19	17,711-18,767
Establishments (# of Establishments)	1,092	23	53	2	45	1	968
Wages (Millions of Dollars)	*Updated information not available*						
GDP[2] (Millions of Dollars)	*Updated information not available*						*$1.7B in Tourism Economy Sales; $2.3B in Visitor Spending in Business Sales*[3]

1- Reflective of Accommodations and Amusement from U.S. Dept of Commerce Bureau of Economic Analysis (BEA), Nov. 2019
2- GDP of Guam = $ 5,920 million in 2018 as reported by BEA, 2019
3- 2018 Characterization of the Ocean Economies, NOAA-OCM, citing Guam Visitors Bureau

Although wage- and GDP-specific data is not available for "living resources" or "all ocean sectors", the 2007 ecovaluation study of Guam's coral reefs reported a "Total Economic Value" of $127 million per year. [40] This value represents use and non-use values as detailed further here:

- *Tourism Value:* With one million people visiting Guam every year, this leads to a marine-associated economic value of US$94.6 million per year. Total annual value of marine-related water sports activities was estimated to be approximately US$8.7 million.
- *Fishery Value:* Using a household survey, the ecovaluation study found that actual share of households in Guam involved in fishing is between 35% - 45%, with the majority of respondents (66%) reporting over 10 years of experience and at least weekly fishing efforts. The majority of the respondents reported fishing to feed their families. However, this non-economic value is

[40] P. van Beukering et al., *The economic value of Guam's coral reefs,* UoG Marine Laboratory Technical Report No. 116, March 2007.

challenging to quantify and may be underreported. The ecovaluation of direct market value fisheries was calculated based on commercial pricing to result in an annual value of US$3.96. The cultural value of fishing was estimated to be nearly US$6 million.

- *Biodiversity Value:* Costs of management of marine protected areas as well as research and monitoring were used as a proxy for biodiversity value and were estimated to be around US$2 million annually.
- *Amenity Value:* Amenity-associated value was estimated through a statistical analysis of a database containing information on more than 800 house sales in Guam during 2000- 2004. It showed that with every additional kilometer from the coast, the value of a given house declined by US$17,000. By extrapolating this relationship, the annual amenity value of coastal attributes in Guam was estimated at US$9.6 million.
- *Coastal Protection:* Reefs function as natural breakwaters; they absorb much of the incoming wave energy and help protect the shoreline from wave attack. In the absence of reefs, rates of coastal erosion and beach loss (and associated economic damage) would be significantly higher. Using GIS, the potential flooding zones caused by storms (and subsequent number of damaged buildings) were determined for two scenarios: 'with reefs' and 'without reefs'. With coral reefs intact, the average damage each year amounts to US$4.3 million. Without the presence of reefs, this damage would increase to a level of US$12.7 million per year. Therefore, the annual coastal protection value is estimated at US$8.4 million.

Type of reef-related value	Economic value (*million $/year*)	Economic value *(% of total)*
Tourism	94.63	74.30%
Diving and snorkeling	8.69	6.80%
Fishery	3.96	3.10%
Amenity	9.60	7.50%
Coastal protection	8.40	6.60%
Biodiversity	2.00	1.60%
Total Economic Value	127.28	

Inflation calculations suggest that US$1 in 2007 is equivalent in purchasing power to about $1.27 in 2020, with an annual inflation rate of 1.88%. This indicates that, assuming no other changes to uses, willingness to pay, or other services assessed, the 2007 total economic valuation of reef-specific resources of US$127.28 would be worth approximately US$162.08 million today.[41]

2. Understanding existing uses within ocean and Great Lakes waters can help reduce use conflicts and minimize threats when planning for ocean and Great Lakes resources. Using Ocean Reports, indicate the number of uses within ocean or Great Lakes waters off of your state. For energy uses (including pipelines and cables, see the "Energy and Government Facility Siting" template

[41] *Inflation Calculator,* Dollar Times, https://www.dollartimes.com/inflation/.

following). Add additional lines, as needed, to include additional uses that are important to highlight for your state.

Uses within Ocean or Great Lakes Waters

Type of Use	Number of Sites
Federal sand and gravel leases *(Completed)*	0
Federal sand and gravel leases *(Active)*	0
Federal sand and gravel leases *(Expired)*	0
Federal sand and gravel leases *(Proposed)*	0
Beach Nourishment Projects	0
Ocean Disposal Sites	0
Principle Ports *(Number and Total Tonnage)*	1, 1M tons in containerized cargo and 170,000 tons in breakbulk cargo for approximately 1.2M revenue tons in FY17
Coastal Maintained Channels	1, Apra Harbor
Designated Anchorage Areas	Naval, Explosive, and General Anchorages within Apra Harbor
Danger Zones and Restricted Areas	1 existing Restricted Area (Apra Harbor); 1 new Danger Zone (Finegayan Danger Zone, 2.36m, July, 2020)
*2020 MITT reauthorized live-fire activities in the Marianas, including periodic "danger zones" around Guam.	

3. In the table below, characterize how the threats to and use conflicts over ocean and Great Lakes resources in the state's or territory's coastal zone have changed since the last assessment.

Significant Changes to Ocean and Great Lakes Resources and Uses

Resource/Use	Change in the Threat to the Resource or Use Conflict Since Last Assessment (↑, ↓, unkwn)
Benthic habitat (including coral reefs)	↑
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	↑
Sand/gravel	Unknown
Cultural/historic	Unknown
Transportation/navigation	↑
Offshore development (including underwater cables and pipelines)	Unknown
Energy production	Unknown
Fishing (commercial and recreational)	↑
Recreation/tourism	↑
Sand/gravel extraction	Unknown
Dredge disposal	Unknown
Aquaculture	No change

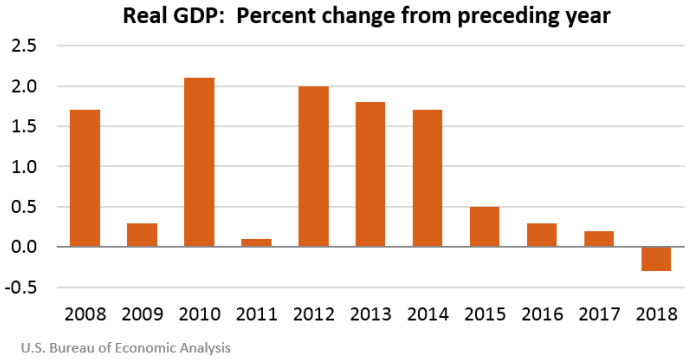
4. For the ocean and Great Lakes resources and uses in the table above that had an increase in threat to the resource or increased use conflict in the state's or territory's coastal zone since the last assessment, characterize the major contributors to that increase. Place an "X" in the column if the use or phenomenon is a major contributor to the increase.

Major Contributors to an Increase in Threat or Use Conflict to Resources

	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm and Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Other- Storms and Typhoons	Other- Military activities	Other- Ocean temperatures	Other -derelict vessels
Benthic habitat (including coral reefs)	X		X	X	X		X	X			X	X	X	X	X
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	X		X	X	X		X				X	X	X	X	
Transportation/ navigation									X			X	X		
Offshore development (including underwater cables and pipelines)												X			
Recreation/tourism	X		X				X				X	X	X	X	
Cultural / historic resources	X		X	X	X								X		
"Danger Zone" / Access restrictions	X												X		

5. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of ocean and Great Lakes resources or threats to those resources since the last assessment to augment the national data sets.

- **2020 BEA Report**
  - As the U.S. Bureau of Economic Analysis reports, the estimates of GDP for Guam show that real GDP—GDP adjusted to remove price changes—decreased 0.3 percent in 2018 after increasing 0.2 percent in 2017. For comparison, real GDP for the U.S. excluding the territories increased 2.9 percent in 2018 after increasing 2.4 percent in 2017.[42]



  - The decline in the Guam economy in 2018 reflected decreases in territorial government spending and private fixed investment that were partly offset by growth in exports of services. Territorial government spending decreased 1.3 percent. Guam government spending on construction and equipment decreased despite progress on major infrastructure projects, including an improved wastewater treatment plant. Private fixed

[42] U.S. Bureau of Economic Analysis, GDP for Guam, 2018, available at https://www.bea.gov/data/gdp/gdp-guam

investment decreased 0.9 percent, reflecting a continued decline in business spending on construction. Although overall construction employment grew in 2018, much of this employment was related to Defense construction; in the private sector, a number of major projects were delayed. Exports of services, which consists primarily of spending by tourists, grew 2.2 percent. This reflected increases in total visitor arrivals and average spending by Korean and Japanese tourists, who make up much of Guam's tourist market.[43]

- **2018 GEPA IR[44]**

  Although extensively detailed in discussion of water quality in the wetlands section of this report, trends identified by GEPA's 2018 Integrated Water Quality Report. Although the report indicates that Guam's marine waters are generally "good", the National Coastal Condition Assessment (NCCA) is ongoing. Known causes of stressors or impairments to Guam's bays and estuaries include pesticides, PCBs, dioxins, nutrients, pathogens, and dissolved oxygen.

- **2018 CRI Guam Status of the Reefs Report[45]**

  - This status report provides a geographically specific assessment of Guam coral reef condition for the period 2012–2017. Guam was divided into three sub-regions based on data resolution, geographical features, and impacts to the ecosystem. Data were collected by NOAA's National Coral Reef Monitoring Program to evaluate the condition of four categories – corals and algae, fish, climate, and human connections. Although Guam coral reefs were evaluated as being in "fair" condition overall, benthic cover was reported as "very impacted" and herbivory levels were "critical" with overall fish indicators suggesting fisheries are "impaired" and fish biomass is low. A clip of the assessment and supporting analysis is included in this section for further reference.

- **2018 NOAA-OCM – Characterizing the State of the Ocean Economies of Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands Final Report[46]**

  - The National Oceanic and Atmospheric Administration's (NOAA's) Economics: National Ocean Watch (ENOW) program provides annual time series data on employment, wages, and gross domestic products relative to ocean-resources dependent sectors of the economy. The 2018 report characterized Guam's overall economy using a combination of U.S. Census Community Business Patterns (CBP), *Guam Statistical Yearbook,* and Guam Bureau of Labor Statistics data. These data indicate that the total economy included 3,475 private establishments that employed between 45,000 and 61,000 people in 2015. CBP data exclude government employment, but the *Guam Statistical Yearbook* indicated that the government employed about 15,8000 people in Guam (excluding about 7,2000 military personnel) in 2015. To characterize the ocean economy, CBP data was supplemented with local data sources and interviews whenever

[43] Bureau of Economic Analysis, GDP for Guam, 2018; October 9, 2019 News Release, available at https://www.bea.gov/news/2019/gross-domestic-product-guam-2018
[44] Guam Environmental Protection Agency, Section 303(d) and 305(b) Water Quality Assessment and Integrated Report, 2018 (2018 IR, GEPA)
[45] Coral Reef Condition: A Status Report for Guam, available at http://guamcoralreefs.com/sites/default/files/guam_status_report_2018.pdf
[46] Characterizing the State of the Ocean Economies of Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands Final Report, prepared by the Eastern Research Group for NOAA Office for Coastal Management, July 2018, available at https://coast.noaa.gov/data/digitalcoast/pdf/econ-pacific.pdf

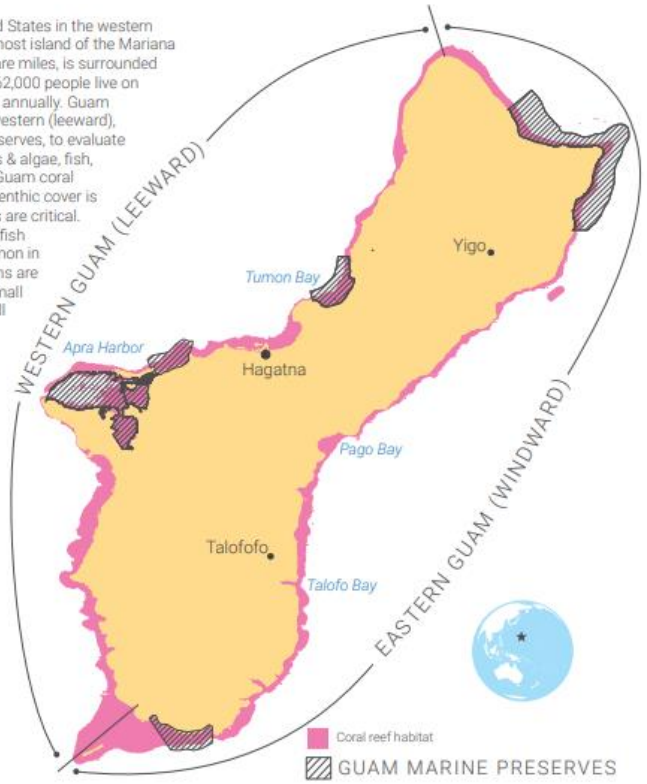
possible. These data indicate that the ocean economy included about 1,078 establishments that employed between 19,500 and 21,300 people, predominantly in the "tourism / recreation" sector. Therefore, based on this report, Guam's ocean economy makes up roughly one third of the private establishments and employment.

- Major conclusions include:
  - Total Economy:
    - Excluding the military, the government employs about 30% of Guam's employed labor force.
    - Guam's total economy is heavily dependent on tourist spending. In 2015, tourist spending surpassed $1.6 billion (Tourism Economics, 2016).
  - Ocean Economy:
    - Overall, according to interviewees, Customs and Border Patrol (CBP) data generally underestimated economic activity in the ocean economy.
    - It is difficult to accurately capture the entirety of the "travel and tourism" sector with only one or two data sources, and this data is also generally deemed to be underestimated by CBP, although it is clearly one of Guam's largest ocean-dependent sectors by a wide margin.
    - It is particularly difficult to capture values of "living resources" accurately because of the high level of self-employment and because many fishermen who sell part or all of their catch do not have a business license. As a result, CBP data and the Department of Revenue and Taxation underestimate this sector.
    - Marine transportation is a key feature of Guam's ocean economy. Freight transportation (i.e., trucking) has a strong indirect tie to this sector.
    - Interviewees felt that the ship and boat building sector was underrepresented by available data.
    - Offshore mineral extraction is not part of Guam's ocean economy.
    - Interviewees also indicated that Guam's National Historical Park and Marine Protected Areas (MPAs) were not reflective of CBP data, which showed no employment in NAICS 712190. This is likely because they are government entities and outside of the scope of CBP data, however, parks and MPAs are significant "ocean resources". The War in the Pacific National Historical Park is a seven-unit park covering over 2,000 acres of sea, land, and beaches. The National Parks Service reported that the historical significance, natural beauty, and recreational activities this park network offers were responsible for 322,000 recreational visitors in 2015. These recreational visitors spent about $18.5M while visiting Guam's historical park units. The War in the Pacific National Historical Park is home to two of five federally designated MPAs, and another five MPAs are designated at the territory level. These MPAs attract tourism, as they are among the most popular dive sites on Guam. They also serve as important sustainability tools, preserving and ensuring the future for these diverse natural habitats.

GUAM CORAL REEFS ARE IN **FAIR CONDITION**

GUAM

Guam is an unincorporated territory of the United States in the western Pacific Ocean. It is the largest and southernmost island of the Mariana Archipelago. The island, which is 210 square miles, is surrounded by fringing coral reefs. Approximately 162,000 people live on Guam, with 1.5 million tourists visiting annually. Guam was divided into three sub-regions, western (leeward), eastern (windward), and marine preserves, to evaluate condition of four categories—corals & algae, fish, climate, and human connections. Guam coral reefs are in fair condition overall. Benthic cover is very impacted, and herbivory levels are critical. Fish are very impacted and overall fish indicators are impaired. As is common in populated areas, reef fish populations are depleted, as indicated by relatively small sizes of fishery species and low overall fish biomass. Climate is also a factor negatively affecting coral reefs. Overall climate conditions are fair. Temperature stress is having an impact on coral reefs. Human connections are good, which means communities support management actions and engage in behaviors that protect reef ecosystems. These conditions show that Guam's coral reefs are moderately impacted, and overall conditions are fair. Guam's reefs are struggling against threats such as pollution, overfishing, and climate change.



WESTERN GUAM (LEEWARD)

Western Guam extends from Ritidian Point in the north, to Tumon Bay and Apra Harbor in the west, to Cocos Point in the south. Western Guam's coral reefs are in an impaired condition. This was the lowest score of all three regions. This region also had the lowest score for corals & algae, a critical score. Climate conditions were fair, and fish indicators were very impacted, leading to an impaired condition.

EASTERN GUAM (WINDWARD)

Eastern Guam extends from Ritidian Point in the north through Pati Point, to Pago Bay and Talofo Bay on the eastern side, to Cocos Point in the south. Eastern Guam's coral reefs are in impaired condition. This region had the highest score for climate, a fair score. Corals & algae were very impacted with an impaired score. Fish indicators were very impacted, leading to an impaired condition.

GUAM MARINE PRESERVES

Guam has five marine preserves, encompassing 11% of the island's coast. They are Pati Point, Achang Reef Flat, Sasa Bay, Piti Bomb Holes, and Tumon Bay. The coral reefs in Guam's marine preserves are in fair condition. This was the highest score of all three regions. This region also had the highest score for fish, a good score. Corals & algae are not scored due to insufficient monitoring data within the marine preserves.

While these scores reflect data collected through summer 2017, very recent data suggest coral reef bleaching has resulted in severe impacts. It is unclear what the impact of the latest bleaching event will be on all reefs of the Mariana Islands, but preliminary information suggests widespread loss across the archipelago.

Biodiversity is a measure of the variety of living organisms. High biodiversity of corals, fish, and other organisms helps keep the ecosystem in balance and makes it resilient to environmental impacts. Although we measure biodiversity, the science is not yet mature enough to score biodiversity in an area. As the science and analysis progress, we will look to include biodiversity scores in future status reports.

What do the scores mean?

Insufficient data, not scored

90–100% Very good	80–89% Good	70–79% Fair	60–69% Impaired	0–59% Critical
All or almost all indicators meet reference values. Conditions in these locations are unimpacted, or minimally impacted or have not declined. *Human connections are very high.	Most indicators meet reference values. Conditions in these locations are lightly impacted or have lightly declined. *Human connections are high.	Some indicators meet reference values. Conditions in these locations are moderately impacted or have declined moderately. *Human connections are moderate.	Few indicators meet reference values. Conditions in these locations are very impacted or have declined considerably. *Human connections are lacking.	Very few or no indicators meet reference values. Conditions in these locations are severely impacted or have declined substantially. *Human connections are severely lacking.

*Human connections data are only collected at the overall Guam level, not the sub-region level.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if any significant state- or territory-level changes (positive or negative) in the management of ocean and Great Lakes resources have occurred since the last assessment?

Significant Changes to Management of Ocean and Great Lakes Resources

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Regional comprehensive ocean management plans	Y	N	N
State comprehensive ocean management plans	Y	N	N
Single-sector management plans	Y	Y	Y – 2016 publication of Guam Strategic Tourism Plan includes ocean resources management components; 2017 Marine Conservation Plan

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

There are no significant ocean and great lakes resources management changes in Guam this reporting period. However, the Marine Conservation Plan for Guam, valid from August 4, 2017 through August 3, 2020 was produced during this period. Sector-specific plans include the 2016 publication of the Guam Visitor's Bureau's (GVB) Strategic Tourism Plan, which includes emphasis on leveraging marine-based tourist attractions, as well as the 2017 and 2020 Marine Conservation Plans which primarily focus on fisheries management outcomes. The 2020 adoption of the Guam Green Growth Initiative further articulates goals and objectives for "life below water" which may support more comprehensive ocean management planning moving forward. Regional planning efforts such as the Mariana Trench Marine Monument plan and the National Ocean Policy planning effort supported by the Pacific Islands Regional Planning Body technically are technically ongoing, but have been lacking necessary funding and support to implement next steps in these processes.

Sector-Specific Management Plans

- **2020 Guam Tourism Strategic Plan[47] –** This tourism-sector focused plan also calls out the draw and financial importance of ocean resources. In the section titled "Where We Want To Be" the plan notes the goal to achieve a unique "blue ocean" product that avoids commoditization and competes on more than just price alone. The plan goes on to discuss "Guam and the Blue Ocean Strategy" stating "Guam already possesses all of the fundamentals from a world-class environment to clear skies and clean blue oceans as well as top quality ocean activities, fishing, SCUBA diving, golf and more. The rest is up to responsible leadership and stakeholder engagement."
- **2017 Marine Conservation Plan[48] –** In 2009 the Western Pacific Regional Fishery Management Council (WesPac) developed a "Fishery Ecosystem Plan" (FEP) as authorized under the Magnuson-Stevens Fishery Conservation and Management Act. That plan represented a shift from species-based fishery management plans that had been developed since the 1980s, to place-based FEPs. These efforts were continued in the 2017 update, developed in partnership with WesPac, DoAg, BSP, and other local resource management experts. Objectives of the 2017 Marine Conservation Plan include supporting domestic fisheries development, collecting data, promoting effective surveillance and enforcement mechanisms, and promoting an ecosystem approach in fisheries management that includes consideration of climate change adaptation and mitigation as well as leverages opportunities for regional cooperation. The 2017 MCP was valid from 2017-2020.[49] A 2020 update was recently published, as discussed further in the Aquaculture section. Despite the shift towards more ecosystem-based management considerations, given the fisheries management focus these plans are characterized as "single-sector" management plans for the purposes of this 309 Assessment Report.
- **Guam Green Growth (G3)** – **Life Below Water[50] –** The G3 Action Framework is focused on five categories of action that include "thriving natural resources" and was signed into action on September 23, 2020. One key element of this planning framework is Sustainable Development Goal 14 - Ensuring sustainability of life below water. Ten-year goals include ensuring protection and active management of high valued marine areas and the aspiration to meet 100% of the 2030 goals of the Micronesia Challenges to achieve effective management of 50% of its marine resources and 30% of its terrestrial resources. To support this, 3- to 5-year objectives include achieving effective management of 30% of marine resources by 2024.
- **Guam Marine Protected Areas (MPAs)** – In the last assessment cycle Guam's Department of Agriculture (DoAg) conducted a study, "Limits of Acceptable Change" to determine impacts on non-fishing areas for the Tumon MPA and Piti Bomb holes MPA to support the Eco-Permit progress. The Limits of Acceptable Change identified areas for marine activities

[47] Guam Visitors' Bureau, Tourism 2020, available at https://www.guamvisitorsbureau.com/docs/reports/guam-tourism-2020-plan/guam-tourism-2020-plan.pdf
[48] Marine Conservation Plan for Guam, available at https://www.regulations.gov/document?D=NOAA-NMFS-2017-0075-0003
[49] Marine Conservation Plan for Guam, NOAA Fisheries, https://www.fisheries.noaa.gov/action/marine-conservation-plan-guam
[50] Guam Green Growth Action Framework, available at https://www.dropbox.com/s/gn09nollc9phg98/G3%20Action%20Framework%20V1.0%20%28Sept%202020%29%20%281%29.pdf?dl=0

other than fishing within the MPA. Efforts to support this permitting program were included in the 2019 Guam Coral Reef Resilience Strategy which included objectives to

1. Prepare a report outlining the Guam Territorial Seashore Protection Act of 1974 (PL 12-108) and the draft Guam Seashore Reserve Plan, the Recreational Water Use Management Plan, the Marine Preserve Eco-permit law (PL 27-87), and other plans and statutes relevant to sustainable recreational use and tourism, including updates on their status, by the end of 2019;
2. Complete a needs assessment on how to improve and effectively implement plans documented by RU1.1, including a feasibility study of sustainable financing options, then update these plans as needed, by the end of 2020; and
3. Conduct inreach with Government of Guam agencies and the Legislature and outreach with local businesses and stakeholders to increase awareness of the importance of these statutes and plans by 2020.

As of the publication of this report, these efforts are ongoing.

Regional Ocean Resource Planning

The U.S. All Island Coral Reef Initiative Coordinating Committee, Micronesian Chief Executive Council, Pacific Island Regional Ocean Body and the Western and Central Pacific Fisheries Commission are regional coordinating bodies. Although NOAA's 2016 Deepwater Exploration of the Marianas sparked public interest and amassed data, the monument management plan remains "in development"[51] and is not detailed further here. Recent regional ocean resource management planning updates include:

- **Pacific Islands Regional Planning Body** – Guam continues to be a member of the Pacific Island Regional Planning Body. A regional plan is presently in draft form. The plan's goal is intended to assist with regional management of coastal and marine areas of the Pacific. The plan will address issues related to economic, social, environmental, security, conservation, and sustainable use of natural and cultural resources for the region. Although regional meetings were held in 2016, 2017, and 2018, no updates to this regional planning effort have been identified since the Guam Ocean Planning Team (GOPT) meeting held April 16-17, 2018. At that meeting, stakeholders developed a draft vision statement and a set of draft goals, articulated the GOPT's statement of purpose, and discussed stakeholder engagement. The draft purpose, vision, and goals were articulated as follows:

  Purpose: Guam's Ocean Plan will provide tools to visualize existing information, and identify data and policy gaps for the collaborative planning of marine uses by local and federal governments, industry, and communities. The Ocean Plan promotes sustainable and compatible uses for the diverse communities and user groups to support a resilient and thriving Guam. Engagement of local stakeholders is crucial

[51] NOAA Fisheries, *Marianas Trench Marine National Monument*, https://www.fisheries.noaa.gov/pacific-islands/habitat-conservation/marianas-trench-marine-national-monument

during the development of Guam's Ocean Plan to attain a product that is useful and relevant for current and future generations.

Vision: A resilient, thriving Guam that adaptively manages marine resource use and access across cultures and diverse communities.

Goals: (1) Healthy marine and coastal ecosystems; (2) sustainable ocean uses; and (3) effective stakeholder engagement.

The April 2018 meeting minutes note that the GOPT had applied for several grants and was awaiting funding to support next steps, including execution of an "ocean planning training" to support these efforts further.

- **Western Pacific Regional Fisheries Management Council**
  The Western Pacific Regional Fisheries Management Council (WesPac) is a federal organization tasked with managing and implementing laws governing fishing within the exclusive economic zone of U.S. Pacific jurisdictions, including Guam and the Commonwealth of the Northern Marianas in Micronesia. During this assessment period, WesPac, DoAG, and other resource management partners supported the publication of the 2020 Marine Conservation Plan, which is discussed in more detail in the "Aquaculture" assessment section.

- **Micronesia Challenge**
  Guam is continuing to support this regional conservation initiative. During this assessment Micronesia Challenge (MC) conservation targets were included as objectives in the Guam Green Growth initiative as detailed further in previous sections of this report.

4. Indicate if your state or territory has a comprehensive ocean or Great Lakes management plan.

Comprehensive Ocean/Great Lakes Management Plan	State Plan	Regional Plan
Completed plan (Y/N)	Y	Marine Conservation Plan, 2017 (Guam EEZ)
Under development (Y/N)	N	Yes, Marianas Trench Marine National Monument: NOAA Fisheries and the U.S. Fish and Wildlife Service are working with Guam and the CNMI Government, Department of Defense, Department of State, U.S. Coast Guard, and others to develop a management plan for the Monument
Web address (if available)		https://www.fisheries.noaa.gov/pacific-islands/habitat-conservation/marianas-trench-marine-national-monument https://www.fws.gov/refuge/mariana_trench_marine_national_monument/
Area covered by plan		MTMNM - 95,216 square miles (246,608 square kilometers) of submerged lands and waters of the Mariana Archipelago east of the Philippines; Guam Marine Conservation Plan – to 200m EEZ

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High _____

   Medium __X__

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Ocean resources are essential to the continuance of the community. Ocean resources are important culturally and for subsistence use through fishing, gleaning, and gathering; as well as the intrinsic value found in recreational activities. As adjusted for inflation, the contributions of economic and non-economic reef resources on Guam are assessed at over $160M in 2020 dollars.

Although oceans and ocean resources are widely viewed as highly important, stakeholders did not consider this enhancement area a high priority for 309 funding in part due to numerous ongoing management efforts. Issues such management of marine resources, nonpoint sources of pollution, and areas of concern are addressed through other priority areas such as SAMP. Issues of concern included legislation to address bio-prospecting, Government of Guam ownership of mineral extraction rights, transparency in ocean disposal data, impact from wastewater and storm water, and GIS data for ocean mapping. Because numerous planning, monitoring, and management efforts are already underway, and based upon stakeholder feedback and current work addressing the priority, Oceans and Great Lakes Resources has been listed as a medium-level priority.

Energy and Government Facility Siting

Section 309 Enhancement Objective: Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance. §309(a)(8)

Resource Characterization:

1. In the table below, characterize the status and trends of different types of energy facilities and activities in the state's or territory's coastal zone based on best-available data. If available, identify the approximate number of facilities by type.

Status and Trends in Energy Facilities and Activities in the Coastal Zone

Type of Energy Facility/Activity	Exists in Coastal Zone	Change in Existing Facilities/Activities Since Last Assessment	Proposed in Coastal Zone	Change in Proposed Facilities/Activities Since Last Assessment (↑, ↓, unknw, nc)
Pipelines	Y (at least 2)	↑	Y	↑
Electrical grid (transmission cables)	Y	↑	Y	↑
Ports	Y	Unknown	Unknown	Unknown
Liquid natural gas (LNG)	N	No change	Y	↑
Oil and gas	Y	↑	Y	↑
Coal	N	No change	N	No change
Nuclear	N	No change	N	No change
Wind	Y (small scale)	↑	Y	↑
Wave	N	No change	N	No change
Tidal	N	No change	N	No change
Current (ocean, lake, river)	N	No change	N	No change
Hydropower	N	No change	N	No change
Ocean thermal energy conversion	N - (was some exploration activity previously but no action)	No change	N	No change
Solar	Y - (at least 25MW; 66MW by some reports)	+ (some additional installations)	Y	
Biomass	N	No change	N	No change
Other (please specify):				

2. If available, briefly list and summarize the results of any additional state- or territory-specific information, data, or reports on the status and trends for energy facilities and activities of greater than local significance in the coastal zone since the last assessment.

Several large-scale energy and government facility siting projects are ongoing, including the expansion and diversification of Guam's energy systems and the military build-up, which are both discussed further here. These proposals include the development and review of extensive environmental impact statements (EIS) which aim to improve public engagement in the planning process as well as support the identification of impacts and promote avoidance, minimization, and mitigation of significant impacts to resources. These activities have "greater than local significance" in the coastal zone both due to potential contributions or mitigations to greenhouse gas emissions and shifts in geo-political relations, as well as likely direct, indirect, and cumulative impacts that are likely to have regional and local implications.

Energy System Expansion

As detailed by the U.S. Energy Information Administration's Territory Profile and Energy Estimates, in 2015, Guam's first commercial solar PV facility—the 26-megawatt Dandan solar farm with more than 120,000 solar panels—began operating. The facility can generate enough electricity to serve 10,000 homes. In August 2018, GPA signed contracts with two companies to provide a total of 120 megawatts of new solar power generating capacity that is scheduled to come online by 2021. Combined, the solar power projects are expected to enable GPA to meet Guam's renewable energy portfolio goal to have 25% of its electricity sales come from renewables by 2021 instead of 2035. GPA is also adding battery storage systems to help maintain grid stability as the utility relies on more renewable electricity generation.[52]

In 2016, Resolution 2016-36 from GPWA Consolidated Commission on Utilities authorized updated 2016 Integrated Resources Plan and issued approval for GPA to pursue about 120 megawatts (MW) of renewable resources while installing new conventional generation to improve efficiency through modernized technology.[53] This includes completion of construction of up to 180MW of dual fired new generation after which GPA plans to retire the Cabras 1 and 2 power plants which are about 42 years old and nearing the end of their useful lives.

Although Guam working to activate the 120 megawatts (MW) of solar power generation reportedly in 2021 to support renewable energy goal targets, permits for the expansion of fossil fuel facilities including a 120 MW plant that would burn ultra-low-sulphur diesel that would later be converted to Liquefied Natural Gas (LNG) have been in development over this reporting cycle. Permit meetings have been delayed in part due to the GovGuam shutdown in response to COVID-19 but are anticipated to continue in the upcoming five-year planning cycle. These efforts are being guided by Guam Power Authority's 2013 Integrated Resources Plan.[54]

[52] See USEIA Territory Profile and Energy Estimates, November 21, 2019, available at https://www.eia.gov/state/analysis.php?sid=GQ
[53] GPWA Consolidated Commission on Utilities Resolution 2016-36, May 24, 2016.
[54] GPWA Integrated Resources Plan, available at http://guampowerauthority.com/gpa_authority/strategicplanning/documents/2013IRPReportFINAL.pdf.
See also GPWA Strategic Planning and Operations Research, http://guampowerauthority.com/gpa_authority/strategicplanning/2012IRP.php.

Department of Defense Build-up Activities

Although several Department of Defense (DoD) "build-up" projects are ongoing, limited new information has been released in this reporting period regarding these activities with the exception of the publication of the supplemental environmental impact statement (SEIS) for the Marianas Islands Training and Testing (MITT) proposal from the Department of the Navy (DoN). A draft SEIS was published on February 20, 2019, the final SEIS was published on June 5, 2020, and the Record of Decision (ROD) was published on August 7, 2020. Numerous comments were submitted from legislative representatives and the general public. As Senator Therese Terlaje, Chairperson of the Committee on Health, Tourism, Historic Preservation, Land and Justice for the 35th Guam Legislature noted many "fundamental concerns raised previously on the 2015 MITT and in the Scoping Period for the 2019 SEIS" remained in the 2019 Draft SEIS and 2020 Final report.[55] Although numerous impacts including the requirement to reauthorize "take" of protected marine species were raised as concerns in scoping discussions and in more than 500 pages worth of input from residents, scientists and elected officials, the U.S. Navy's plans for its training and testing activities in the region as reflected in the DEIS and FEIS remained largely unchanged.[56]

The 2019 Draft SEIS and 2020 Final SEIS included some new information on endangered species in the marine area of the nearly one million nautical mile MITT range. Numerous public comments raised questions about impacts to marine species and recent observed beaching events, which were generally addressed in the Final SEIS with responses that ranged from discounting recently published reports that indicated significant correlations between DoN sonar use and whale strandings to commitments to continue "practicable" monitoring and mitigation measures which are limited to brief waiting periods when assigned "Lookouts" sight a protected species before or during an activity.

As detailed further in the following subsection, the Guam Coastal Management raised an objection with the Navy in April, 2020, pointing to a discrepancy between the Navy's plans and consistency with local laws that require protection of endangered species. Specifically, Guam Coastal Management's Resource Policy Four states: "All living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from over harvesting, and in the case of marine mammals, from any taking whatsoever." The DoN responded to this objection in a June 8, 2020 letter indicating that the proposed activities would include the use of sonar and explosives, which have the potential to take corals, sea turtles and marine mammals. Emphasizing that these activities are necessary to "maintain, train, and equip combat-ready military forces capable of winning wars, deterring aggression and maintaining freedom of the seas" the Navy concluded it was consistent to the maximum extent practicable and indicated it would proceed with these activities over the GCMP objection.

On July 13, 2020, Governor Lourdes Aflague Leon Guerrero issued a letter to Pacific Fleet Rear Admiral John Adametz requesting that the Navy engage GovGuam in informal mediation, "so that we can work to mediate or minimize our disputes regarding certain proposed actions as it relates to the taking of marine

[55] Senator Therese Terlaje's submitted comments on 2019 draft Supplemental Environmental Impact Statement (SEIS), available at http://senatorterlaje.com/home/sample-page/senator-therese-terlajes-submitted-comments-on-2019-draft-supplemental-environmental-impact-statement-seis/.

[56] A. Kaur, *Despite public comments, Navy's testing plans are largely unchanged,* Pacific Daily News, June 16, 2020 https://www.guampdn.com/story/news/local/2020/06/15/guam-navy-testing-plans-marine-whale-sonar-concerns/3172567001/.

mammals." On July 22, Adametz declined the governor's request, stating that a record of decision must be completed for the Navy's plans by July 31.[57] The ROD was issued on August 7, 2020.

Other activities, such as the expansion of the "danger zone" at Finegayan did not go through the extensive review process requiring the development of a draft and final EIS for public comment; rather, the new 892 acre Finegayan "danger zone" designation was simply published in the Federal Register as a routine rulemaking. The draft rule was published in the U.S. Federal Register on December 13, 2018, drawing a total of 45 comments, including requests for a public hearing which was declined by USACE.[58] The final rule was published in the Federal Register on July 20, 2020, and became effective August 19, 2020.[59] GCMP indicates that this proposal was not reviewed and did not receive a federal consistency determination and maintains that "the nature of this project may result in impacts that would obstruct navigable waters" and it "should be subject to review."[60]

3. Briefly characterize the existing status and trends for federal government facilities and activities of greater than local significance in the state's coastal zone since the last assessment.

As indicated by the ongoing development of permit applications and supporting EIS reports, the growth of energy siting and expansion of DoD facilities is continuing to increase within Guam's coastal zone.

Ongoing DoD Build-up and related impact "offset" projects anticipated in the upcoming planning period include:

- Defense Community Infrastructure Pilot Program (DCIP) - $3,506,426 to the Municipality of Chalan Pago-Ordot, Guam**,** to undertake a $6,506,426 project to construct a Multipurpose Recreation and Emergency Center to support military families on Guam in FY2020 appropriations;[61]
- FY19 Department of Defense last fiscal year obligated a total of $309.3 million for projects related to the Guam military buildup and spent a total of $210.2 million on those projects, according to a report prepared by several inspectors general for the federal government. Most of the buildup funding last fiscal year was provided by the government of Japan, the report states, with $208.4 million obligated for the buildup and $100.7 million spent. About 5,000 Marines from Okinawa and elsewhere are scheduled to relocate to a new Marine Corps base in Dededo, Camp Blaz, beginning in 2025. The relocation is expected to cost about $8 billion, with Japan providing about $2.8 billion.

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[57] A. Kaur, *Guam Coastal Management objective to Navy's training plans, Navy proceeded anyway,* Pacific Daily News, October 5, 2020; https://www.guampdn.com/story/news/local/2020/10/04/guam-coastal-management-navy-harm-mammals/5800029002/?fbclid=IwAR1pTmsdGzPFaC-NDn1nma50WfieQSxLOkUmfzCGBPqFSXET12hSx_hhe3U.

[58] M. Cagurangan, *Restricted area in Finegayan now officially off-limits to public*, Pacific Island Times, August 19, 2020; https://www.pacificislandtimes.com/single-post/2020/08/19/Restricted-area-in-Finegayan-now-officially-off-limits-to-public.

[59] Final Rule, Department of the Army, Corps of Engineers; Pacific Ocean at Naval Base Guam Telecommunication Site, Finegayan Small Arms Range, on the Northwestern Coast of Guam; Danger Zone, July 20, 2020, available at https://www.federalregister.gov/documents/2020/07/20/2020-14131/pacific-ocean-at-naval-base-guam-telecommunication-site-finegayan-small-arms-range-on-the?utm.

[60] K. Kerrigan, *Military: No plans to expand firing range*, Guam Daily Post, January 18, 2019; https://www.postguam.com/news/local/military-no-plans-to-expand-firing-range/article_00a470fe-1a2d-11e9-a714-2fea3f1728a8.html.

[61] Defense Community Infrastructure Pilot Program (DCIP), Office of Economic Adjustment, https://oea.gov/defense-community-infrastructure-pilot-program-dcip.

The annual report on the Guam Realignment, due by Feb. 1 each year, is required by a provision of the 2010 defense budget.[62]

- About 5000 US marines based in Japan's Okinawa and elsewhere are scheduled to relocate to a new base on Guam in Dededo, beginning in 2025. The relocation is expected to cost about $US8 billion, with Japan providing about $US2.8 bn. The latest annual report on the Guam Realignment follows an audit which reviewed why some completed and ongoing military construction projects on Guam are behind schedule and over budget. According to the audit, by the Defense Department's Office of Inspector General, the nine projects, with a total budget of $US638.87M, were a combined 13 years and five months behind schedule and $US37.5M over budget. The main reason for project delays, the audit states, is the military's failure to adequately plan for unexploded ordnance at the project sites. That was a contributing factor to delays in six of the nine projects examined, the report states. The next most common reason was the inability to secure skilled foreign labor under H-2B visas, the report states. Labor visa issues contributed to delays in four of the nine projects.[63] H.R. 6395 the "William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for Fiscal Year 2021," allowed H-2B exemptions for military-related projects. However, this failed to provide relief for commercial projects, which also saw an increase in cost due to the labor shortage. The Guam Economic Development Authority estimates up to $1 billion in cancelled or delayed private sector projects because of this problem, according to San Nicolas.[64] The proposed funding includes a $20M "space control facility" for the Site Activation Task Force for the Guam Air National Guard's Space Control Squadron, which would be one of nine "small launch rocket missions". If the spending gets Congress' approval, the overall value of military construction projects for Guam would represent a significant increase from recent years and could reach close to $1.2 billion in two budget years.[65] As of the publication of this report, H.R. 6395 passed the U.S. House of Representatives, was read twice before the Senate and was placed on the Senate Legislative Calendar.[66]

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) that could facilitate or impede energy and government facility siting and activities have occurred since the last assessment.

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[62] S. Limtiaco, *Military spent $210.2M on Guam buidup last fiscal year*, Pacific Daily News, February 6, 2020; https://www.guampdn.com/story/news/2020/02/05/guam-dod-military-budget-defense-funding-2019-fiscal-year/4663732002/.

[63] Radio New Zealand, Pacific News, February 8, 2020; https://www.rnz.co.nz/international/pacific-news/409087/guam-military-build-up-faced-with-delays-and-cost-overruns.

[64] *Amendment in 2021 NDAA extends Guam's H2B authorization to civilian projects;* Guam Daily Post, July 20, 2020; https://www.postguam.com/news/local/amendment-in-2021-ndaa-extends-guams-h2b-authorization-to-civilian-projects/article_98a37fd2-ca0b-11ea-b4b9-57ebd6520aed.html.

[65] G. Daleno, *Defense budget proposes 3% military pay raise, $723M Guam projects,* The Guam Daily Post, February 12, 2020; https://www.postguam.com/news/local/defense-budget-proposes-military-pay-raise-m-guam-projects/article_1370e3e6-4cab-11ea-aa2d-2704a86d318f.html.

[66] H.R.6395 - William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Bill Overview, Last Revised Aug. 5, 2020; https://www.congress.gov/bill/116th-congress/house-bill/6395.

Significant Changes in Energy and Government Facility Management

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Statutes, regulations, policies, or case law interpreting these	N	N	N
State comprehensive siting plans or procedures	Y	Y	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

There are no significant energy and government facility statutes or regulations this reporting period. However, updated plans and relevant projects, as well as revised federal regulations addressing H2-B work visas and funding appropriations for major "build up" projects are outlined above and summarized further here. These large energy and government facility siting projects – including a pending proposal to construct a project consists of a 120 MW plant that will burn ultra-low-sulphur diesel (ULSD) and will later convert to Liquefied Natural Gas (LNG) – are major undertakings that require permitting review. Federally funded projects will also go through the Federal Consistency review process. Guam has 17 enforceable polices, implemented through the GCMP's Federal Consistency process, that work to protect the island's natural beauty and foster responsible and balanced growth.

As recent news articles highlight, elements of the ongoing build-up have been the source of increasing controversy. For example, when the Navy finalized its plans under the supplemental Mariana Islands Training and Testing (MITT) proposal in July of 2020, it proceeded over an objection from Guam Coastal Management regarding inconsistency with enforceable policies that prohibit "take" of marine mammals, and declined Gov. Lou Leon Guerrero's request for mediation on the matter. The Navy indicated that insufficient time remained to enter mediation, however, the fact that this proposal to expand marine testing elements of the previously authorized MITT for the next seven years at a time when GovGuam agencies were effectively in shutdown due to COVID-19 continues to raise procedural and substantive concerns regarding impacts and potential mitigation measures.

Although program enhancements proposed in this 309 Report will not directly address the procedural challenges or the need to ensure early and ongoing coordination with large government facility and energy siting proposals, any program changes that resulted in new or revised federal consistency requirements would be incorporated into revised enforceable policies which would be proposed for OCM's review and approval. Meanwhile, GCMP is continuing to work to improve coordination procedures, including reviewing the "standard operating procedure" for plans and activities being developed by Joint Region Marianas – a procedural mitigation which was one of several commitments the

Navy made in the August 2020 MITT Record of Decision aiming to improve communication and streamline regulatory review and supporting improved compliance.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

   High _____

   Medium __X__

   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Based on stakeholder feedback from various government agencies, energy and government facility received a “medium” priority ranking, up from “low” in the last planning cycle. Numerous energy and facility siting plans and projects are currently being proposed or implemented. Although this enhancement area was downgraded from “high” to “low” between the 2010 and 2015 plan updates due to major investments in renewables by the utility agencies, continuing build-up and lengthy EIS and permit reviews required by existing and proposed projects and potentially significant impacts and increased contentiousness of some proposed activities prompted stakeholders to increase the prioritization this planning cycle.

Aquaculture

Section 309 Enhancement Objective: Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable states to formulate, administer, and implement strategic plans for marine aquaculture. §309(a)(9)

Resource Characterization:

1. In the table below, characterize the existing status and trends of aquaculture facilities in the state's coastal zone based on the best-available data. Your state Sea Grant Program may have information to help with this assessment.

Status and Trends of Aquaculture Facilities and Activities

Type of Facility/Activity	Number of Facilities	Approximate Economic Value	Change Since Last Assessment
Aquaculture farms	Guam Aquaculture Development and Training Center (GADTC) / "Fadian Hatchery" Total # of Farms = 1 main facility; Interviewees indicate there are some small non-commercial freshwater operations but total number is not documented (see NOAA-OCM, 2018)	$460,500 (In 2013 State Statistical Yearbook, BSP); $2M GADTC renovation proposed in 2018	↑
Tanks	GADTC hosts 14 concrete ponds, including six 200 sq. meter Swedish ponds and four 200 sq. meter raceways. Numerous fiberglass tanks fill the area ranging in size from 0.5 to 20 metric tons.[1] Total # of Ponds = 14	*See above*	No change
Aquaponics	UoG Triton Farm Total = 1 Small-scale backyard aquaponics increasing with UoG support	*See above*	↑
In-water Coral Nursery	Total # of Coral Nurseries = 2 Piti Bomb Holes Marine Preserve Cocos Lagoon / Merizo nursery[2]	Total: $80K reported in last assessment; $1.4M to support coral restoration and outplanting in ongoing UoG Marine Lab project	↑
1 - Source: UoG, https://cnas-re.uog.edu/expertise/aquaculture/ 2 – Source: Guampedia, https://www.guampedia.com/restoring-guams-coral-reefs/#Coral_nurseries			

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from aquaculture activities in the coastal zone since the last assessment.

As outlined further in this section, interest in investing in on-land and in-water aquaculture has been increasing, along with the recognition that healthy coral reefs will be needed to support abundant reef fisheries. The 2018 CRI State of the Coral report detailed in the SAMP section highlights that herbivorous fisheries on Guam are facing severe local and global stressors. However, numerous aquaculture and coral

reef restoration efforts aiming to increase productivity and enhance resilient fisheries systems are underway, with notably increases in partnerships and funding reflecting growing interest and efforts relevant to aquaculture since the last assessment.

Guam Aquaculture Development and Training Center

The Guam Aquaculture Development and Training Center (GADTC), also known as the Fadian Hatchery, is the largest and oldest aquaculture center in the Western Pacific. It was originally built as a private facility designed to produce fish and eel fry for the Asian market and was transferred to the Government of Guam in 1986 and to the University of Guam (UoG) in 2001. The hatchery is a bio-secure facility in Mangilao that strives to support aquaculture development on Guam and the Western Pacific through research, education, direct farmer support and service. There are 14 concrete ponds on the site, including six 200 sq. meter Swedish ponds and four 200 sq. meter raceways. Numerous fiberglass tanks fill the area ranging in size from 0.5 to 20 metric tons. Current products of the hatchery include high-health (Specific Pathogen Free) shrimp post-larvae and brood stock, improved strains of tilapia fry and Claris catfish fry.[67]

In 2017, finding that the three acres of property that the facility operated on for over forty years to be insufficient to adequately support the growth needs of the facility and its research program, Bill 18-34 proposed the transfer of additional land from a portion of the Municipality of Mangilao to the University of Guam for the expansion of the GADTC facility.

In 2018, UoG announced renovation plans for the facility. The estimated $2 million renovation will be funded through a long-term public-private partnership. The UoG Board of Regents has authorized the university to enter into a lease partnership for a period of up to 30 years to support the renovation of the existing concrete ponds and the facilities as well as add more ponds, construct a new well and cistern, and replace the piping in the existing system. At the 2020 309 Stakeholder meeting, a representative from UoG's Aquaculture program elaborated that the Aquaculture Taskforce was established by the Governor and is looking at backyard subsistence level visual promotion for aquaculture. Also, former commercial aquaculture producers with land-based ponds, many of whom have gone out of business or are idle at the moment, are regrouping and looking to develop an aquaculture producers group so they will be a major stakeholder and can provide a lot of input in terms of aquaculture development. There has been no Aquaculture plan revision since 2010 so that needs to be updated, and the Aquaculture Taskforce may address that as well.

UoG Triton Farm, Guåhan Sustainable Culture (GSC), and Aquaponics Workshops

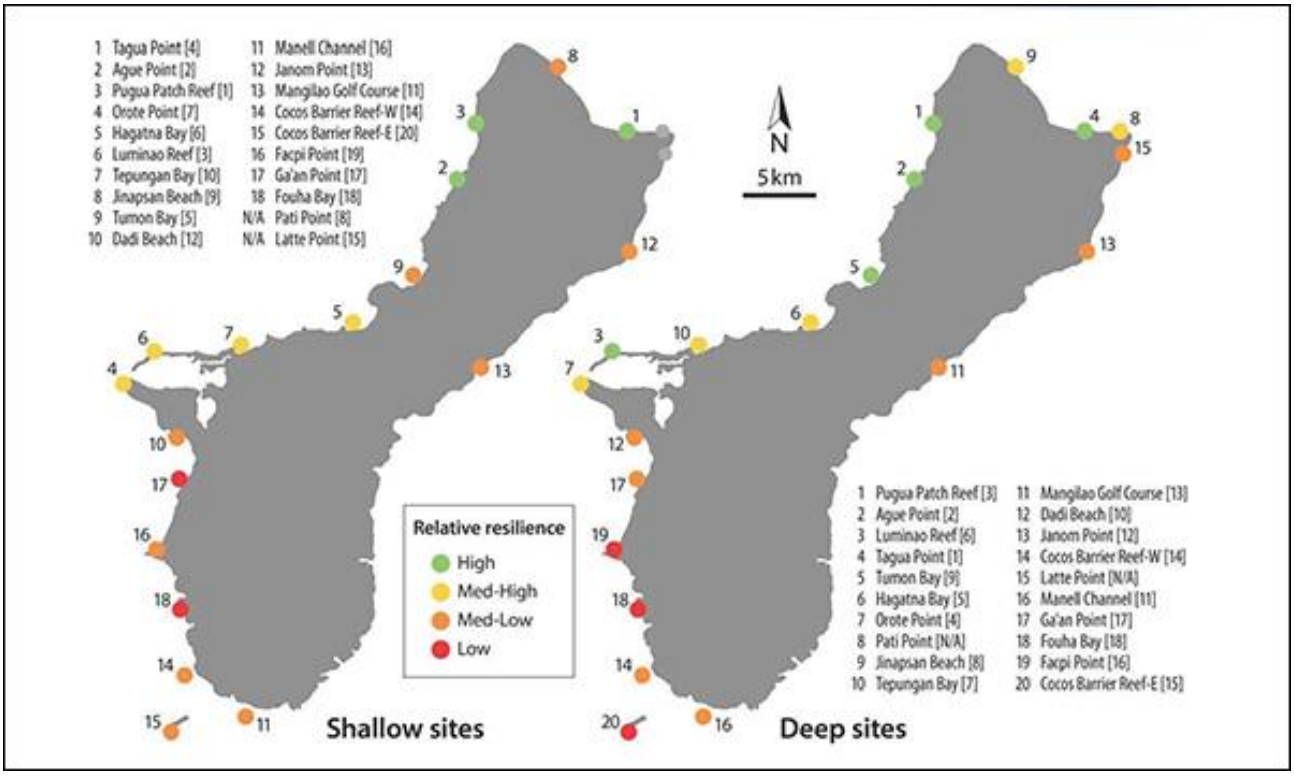
Guåhan Sustainable Culture aims to cultivate ideas and strategies of environmental sustainability within the local community through practical education, social engagement, and collaborative partnerships.[68] On May 25, 2019, GSC and partners from the Western Sustainable Agriculture Research and Education program held an "Introduction to Aquaponics" workshop at the Farmers' Cooperative Association of Guam located in Dededo.[69] The second portion of the workshop was held at the UoG Triton Farm, where participants were invited to view a live aquaponic system at work. The Triton Farm was established over

[67] *Fadian Hatchery*, UoG College of Natural and Applied Sciences, https://cnas-re.uog.edu/fadian-hatchery/.
[68] Guahan Sustainable Culture, Mission and Vision, https://gusustainable.org/mission-and-vision/.
[69] T. Celis, *Local farmers won't want to miss these May workshops,* Pacific Daily News, https://www.guampdn.com/story/life/2019/05/15/aquaponics-farm-school-agroforestry-subsistence-farming-grants-guam-2019/3674293002/.

a decade ago and aims to serve as an integrated farm model that encourages agricultural research and the use of sustainable farming methods, and offers regular community education and outreach events.[70]

Building Reef Resilience

The link between healthy coral reefs and thriving fisheries is increasingly being recognized. In 2017, Mayand et al. published a study of coral reefs on Guam with the goals to assess percentage cover of major benthic groups and analyze relative resilience potential of coral reefs at two depths and compared to survey sites to determine drivers of differences in resilience potential between sites. The study found that coral cover was higher on average in the shallow (25%) survey areas than the deep areas (19%), and, based on an approach that normalized resilience scores, three sites with relatively high resilience were identified in northern Guam. The study noted a "strong pattern that relative resilience classes for survey sites are higher in the northern half of Guam and lower in the southern half" at both observed depths (see site survey locations and rankings in the image below). These observations and continued monitoring provide data to support a "resilience-based management" (RBM) approach to overcoming degradation and maintaining the provisioning of ecosystem goods and services that coral reefs provide. The project summary notes that the Marine Fisheries Management Plan of Guam explains that understanding the resilience of reef fisheries and the coral reefs upon which they depend is needed for future assessments of yield. This project was designed to meet this need, and monitoring continues.[71]



[70] A. Dedicatoria, *Triton farm promotes natural farming,* April 10, 2017, UoG Triton's Call Newsletter, https://tritonscall.com/triton-farm-promotes-natural-farming/.

[71] Maynard, J., Johnson, S.M., Burdick, D.R., Jarrett, A., Gault, J., Idechong, J., Miller, R., Williams, G.J., Heron, S.F., Raymundo, L. (2017). Coral reef resilience to climate change in Guam in 2016. NOAA Coral Reef Conservation Program. NOAA Technical Memorandum CRCP 29, 51 pp., available at https://www.coris.noaa.gov/activities/guam_coral_resilience/.

In 2017, the Guam Coral Bleaching Response Plan was developed through the collaboration of multiple local and federal agencies, including the Bureau of Statistics and Plans (BSP) and the Guam Coastal Management Program (GCMP), the Guam Department of Agriculture's (GDOAG) Division of Aquatic and Wildlife Resources (DAWR), the Guam Environmental Protection Agency (GEPA), the University of Guam Marine Laboratory (UOGML), the National Oceanic and Atmospheric Association (NOAA), the National Park Service (NPS), Joint Region Marianas (JRM), and the U.S. Fish & Wildlife Service (USFWS). The Guam Coral Bleaching Response Plan exists to maximize the effectiveness of activities conducted by the Guam Coral Reef Response Team and ensure efficient use of resources and human capital by providing a standardized framework for responding to coral bleaching events. Coral bleaching is largely driven by ocean warming that cannot be directly influenced at a meaningful scale by local intervention, therefore the management response to coral bleaching is especially complex and challenging.

This plan was first drafted in 2011 and finalized in 2017, with support of an interagency memorandum of understanding. Although this document is intended to be a working draft that will be periodically updated and improved. This plan includes an in-depth description of Guam's early warning system for coral bleaching events, standard operating procedures for response implementation including detailed assessment protocols, and recommendations for post-bleaching management, reef recovery, and restoration approaches. This document is intended for use by coral reef managers and scientists on Guam, but may also be useful to individuals and groups in other locations impacted by coral bleaching, especially those who are interested in developing similar coral bleaching response plans.

Objectives of the Guam Coral Bleaching Response Plan:

1. Summarize the impacts of past bleaching events on Guam.

2. Provide up-to-date standard operating procedures to be followed before, during, and after coral bleaching events, including contact information for key parties; lists of agency assets and necessary supplies; and delineation of relevant local and federal policies and agency roles.

3. Develop a protocol to monitor projections of thermal stress and coral bleaching events and provide early warning of major coral bleaching events on Guam.

4. Create a framework for an optimal bleaching response, including:

    a. Measurement of the spatial extent and severity of mass coral bleaching events, including impacts to non-coral organisms;
    b. Assessment of the ecological and socioeconomic impacts of mass coral bleaching events;
    c. Identification of resilient reef areas on Guam;
    d. Formation of a plan to mitigate bleaching impacts and restore bleached ecosystems; and,
    e. Development of a pathway for communicating findings to decision makers.

5. Involve the community in monitoring the health of Guam's reefs.

6. Communicate with the local media and raise public awareness of the impacts of bleaching on Guam's reefs.

Plan recommendations include establishing survey methods and data sharing, funding response activities, and continuing to support reef recovery and restoration efforts.

Growing Coral Nurseries for Resilience-based Management

Coral nurseries are a RBM tool that can help increase reef resiliency. The number of coral nurseries have doubled this reporting period. In 2013, the University of Guam Marine Laboratory, Underwater World Guam, and SECORE International established an ocean coral nursery in Guam's Piti Bomb Holes Marine Preserve. The nursery cultures both sexual recruits and fragmented corals for rehabilitation and replanting. In 2019, a second nursery was established in Cocos Lagoon: the Merizo coral nursery.[72] Coral reef restoration is increasingly important as the impacts of climate change on Guam's reefs are accelerating.

In December, 2019, the UoG Marine Lab announced the receipt of $865,000 for coral restoration efforts that aim to result in 4.15 hectares of planted coral substrate over the next three years. The competitive grant from the National Fish & Wildlife Foundation through its National Coastal Resilience Fund will be matched with $596,000 raised by the university, bringing the project total to $1.4 million. The project will involve propagating types of staghorn corals that survived mass bleaching and mortality events in the last five years and outplanting cultured corals onto reef flats in Tumon, Piti, and Cocos/Achang while developing best restoration practices, including determining optimum planting density, maximizing genetic diversity, and examining environmental influences that impact the process.[73]

To save Guam's reefs, scientists and managers are investigating multiple methods for coral reef restoration to determine which approaches are most effective. In May of 2018, local natural resource managers, researchers, and other stakeholders convened the first meeting of the Guam Reef Restoration and Intervention Partnership (GRRIP); the primary goal of this group is to develop a strategy for coral reef restoration to ensure that coral reefs will be enjoyed by many future generations on Guam.[74]

With support from BSP-GCMP, in June 2019 the Government of Guam (GovGuam) formally adopted the Guam Reef Resiliency Strategy (GRRS). The GRRS is now being used to guide coral reef management and allocate funding for Guam's 22,500 hectares of reef.[75] In 2020, four GovGuam agencies and one non-government entity – UoG, BSP, DoAg, GEPA, and UnderWater World Inc., – formalized a memorandum of understanding to support the GRRIP and grow the alliance of Guam's coral reef scientists and resource managers to support reef restoration, rehabilitation, and damage mitigation.[76]

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any state- or territory-level changes (positive or negative) that could facilitate or impede the siting of public or private aquaculture facilities in the coastal zone.

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[72] *Restoring Guam's Coral Reefs,* Guamapedia, https://www.guampedia.com/restoring-guams-coral-reefs/#Coral_nurseries.
[73] *Marine Lab secures grant for innovative coral restoration work,* December 2, 2019, UoG News and Announcements, https://www.uog.edu/news-announcements/2019-2020/2019-marine-lab-secures-grant-for-innovative-coral-restoration-work.php.
[74] Guam Year of the Reef Newsletter, June 2018, http://www.guamcoralreefs.com/guam-year-reef-newsletter-june-2018.
[75] Year in Review 2019, Reef Resiliency Network, February 27, 2020, https://reefresilience.org/year-in-review-2019-2/.
[76] A. Dedicatoria, *Partneship to help Guam coral reefs signed,* February 19, 2020, Pacific News Center https://www.pncguam.com/coral-reef-authorities-in-guam-sign-partnership-agreement/.

Significant Changes in Aquaculture Management

Management Category	Employed by State or Territory	CMP Provides Assistance to Locals that Employ	Significant Changes Since Last Assessment
Aquaculture comprehensive siting plans or procedures	N	N	Y
Other aquaculture statutes, regulations, policies, or case law interpreting these	N	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:

    a. Describe the significance of the changes;

    b. Specify if they were 309 or other CZM-driven changes; and

    c. Characterize the outcomes or likely future outcomes of the changes.

There are no significant 309 or CZM-driven changes to aquaculture facility management in Guam, however, as detailed further in this section, ongoing assessments and initiatives indicate significant increases in interest and investment signaling potential growth in the years ahead.

As outlined in the Guam Coral Reef Resilience Strategy, several laws that were passed since the last assessment period that also relate to fisheries management. While laws that relate to coral reef management areas are detailed further in the SAMP section, of particular relevance to the aquaculture enhancement areas is the Marine Conservation Act of 2018, which is detailed further here:

- **PL 34-72, 2018 – Marine Conservation Act of 2018**
  PL 34-72 states that the issues facing Guam's coral reefs are too numerous and severe to be addressed by any one Government of Guam agency, and thus a participatory community-based fisheries management approach is necessary to properly manage and conserve these resources. The law defines community-based fisheries management as "a system in which fishermen and their communities exercise primary responsibility for stewardship and fisheries management, to include taking part in the decision-making on all aspects of fisheries management, such as harvesting, access, compliance, research, and marketing." This law grants authority to the Director of DoAg, village mayors, and Municipal Planning Councils to establish community-based fisheries managed areas and create fisheries management plans. The Directors of DoAg and BSP are enlisted to provide technical guidance to the mayor and the Municipal Planning Council of Humatak to establish Humatak Bay as a community-based fisheries management area and develop a community-based management plan. The resulting Marine Conservation Plan (MCP) was published in September, 2020. The MCP objectives aim to support:
    1. Fisheries Resource Assessment, Research, and Monitoring
    2. Effective Surveillance and Enforcement Mechanisms
    3. Public Participation, Research, Education, Outreach, and Local Capacity Building
    4. Domestic Fisheries Development

5. Recognizing the importance of island cultures and traditional fishing practices and community-based management

Specific strategies to support these objectives include the proposed development of a herbivore reef fish hatchery with a focus on *S. spinus*, or rabbitfish. This project aims to support the development of a fully-functional marine aquaculture facility within the Guam Department of Agriculture for subsistence fishing and restocking purposes.

Additionally, in 2019, Governor Lou Leon Guerrero established the Guam Aquaculture Taskforce by Executive Order and as of 2020 an aquaculture industry feasibility study is underway.[77] Noting that farming bacteria-free shrimp could be a multi-billion dollar industry, in addition to the fact that Guam imports "some $10 million worth of seafood products annually," Governor Lou Leon Guerrero emphasized that aquaculture is also one place the island can turn to for local food security".[78]

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____

Medium _X_

Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Aquaculture has been identified as an area of potential opportunity for the community to develop more self-sustaining methods of food production, and several projects are currently underway. However, at this time aquaculture is not a major industry in Guam. Although "aquaculture" received the lowest ranking in the 2020 Stakeholders Survey, follow-up discussions with GCMP resulted in the elevation of this enhancement area to "medium" as BSP-GCMP works to support next steps in the aquaculture feasibility study and discussion of recommendations and next steps during the upcoming reporting period.

[77] Staff Reports, *Governor pushes for study on aquaculture industry on Guam,* July 26, 2020, Pacific Daily News, https://www.guampdn.com/story/news/local/2020/07/25/gov-lou-leon-guerrero-guam-aquaculture-industry-study/5484874002/.
[78] H. E. Gibert, *Governor: With bacteria-free farmed shrimp, Guam could be aquaculture capital of Pacific,* April 30, 2019, Pacific Daily News, https://www.guampdn.com/story/news/local/2019/04/30/governor-bacteria-free-shrimp-guam-could-aquaculture-capital/3623847002/.

Phase II (In-Depth) Assessment

Based on stakeholder surveys and follow-up interviews with the GCMP and OCM, three "high priority" enhancement areas were selected for Phase II in-depth assessment in this 309 Assessment and Strategy Report. These are: Coastal Hazards, Cumulative and Secondary Impacts (CSI), and Special Area Management Planning (SAMP).

Coastal Hazards

In-Depth Resource Characterization:

1. Based on the characterization of coastal hazard risk, what are the three most significant coastal hazards within your coastal zone? Also indicate the geographic scope of the hazard, i.e., is it prevalent throughout the coastal zone, or are there specific areas most at risk?

	Type of Hazard	Geographic Scope
Hazard 1	Flooding (coastal, riverine, stormwater)	Tumon (economic), Merizo, Umatac (water volume), Harmon (highlighted in RiskMAP)
Hazard 2	Shoreline erosion / Coastal storms / Riverine and storm surge	Erosion at sandy western beaches; surge risks to Apra Harbor, Hagatna, Tamuning, Agat, Merizo, Umatac – (Riverine erosion: Santa Rita and Talofofo)
Hazard 3	Sea level rise / salt water intrusion	*Piti / Merizo (at 1ft) / Asan / Hagatna / Agat (at 3ft) / Tamuning / N. Aquifer)*

2. Briefly explain why these are currently the most significant coastal hazards within the coastal zone. Cite stakeholder input and/or existing reports or studies to support this assessment.

Flooding was identified as a leading concern in stakeholder surveys. In follow-up interviews and at the Stakeholder Meeting, concerns regarding specific impacts to environmental quality as well as public safety were frequently raised. The USACE flood hazard reports produced in the last reporting cycle highlight that river systems in southern Guam are especially at risk of flood events, with 2-year storms likely to flood residences and 100-year storms projected to overtop critical infrastructure. Risks of terrestrial or riverine flooding are compounded by rising sea levels which also present area-specific and island-wide management challenges. The 2019 Sea Level Rise and Social Vulnerability Assessment shows that built infrastructure in Hagatna was especially vulnerable to coastal flooding due to increasing sea level rise, while Agat was identified as most vulnerable due to socio-economic factors. Flooding poses short- and long-term threats to people, infrastructure, and the environment, and therefore has been identified as a leading management priority for the upcoming 309 planning cycle.

Shoreline Erosion and Coastal storms (including storm surge) were also mentioned in stakeholder surveys as issues of concern. While flooding describes terrestrial and coastal processes, this hazard category is specific to marine systems that cause erosion and wave run-up events. The recent Agat Bay flood hazard assessment found the variability in erosion and accretion along the shoreline shows that sediment movement within the region is complex, and not strongly dominant in one direction or the other alongshore, but rather influenced by small circulation cells controlled by bathymetry and coastal morphology. The reaches in the middle of the region between Namo River/Inn on the Bay south through

Agat SBH are relatively stable over the long-term, with a few erosion "hot spots", but overall a slight gain of sediment. The southernmost area between Nimitz Beach and Facpi Point appears slightly erosive over the historical period of analysis. The USACE study assessed existing harbor conditions and found that (1) strong currents through the harbor that affect navigation and berthing of vessels, and have caused damages to harbor infrastructure (i.e. – boat slips), and (2) shoaling caused by sediment transported into the harbor, which reduces authorized depths in the channels and results in increased maintenance requirements. The study proposed in-water breakwater interventions ranging in cost between $7 to $10 million as well as shoreline stabilization concepts ranging from $260,000 to $465,000. With the increasing focus on assessing and funding opportunities to leverage "nature-based solutions" to address shoreline change and erosion, additional cost benefit analysis including consideration of green infrastructure investments that could be paired with ongoing reef restoration efforts may be warranted. Given the high-value assets in place at these harbor and shoreline facilities, continued planning efforts to reduce risk and protect critical infrastructure remains a high planning priority.

Sea level rise and salt water intrusion pose unique management challenges to Guam's groundwater infrastructure. Chloride concentration of water is an indicator of the amount of seawater that has mixed with the fresh rainwater infiltrated to the freshwater-lens system. Increasing chloride levels documented in recent WERI reports on the Northern Guam Lens Aquifer (NGLA) indicate salt water intrusion may already be occurring, whether due to over pumping, rising sea levels, or a combination of these stressors. Because groundwater is the source of approximately 80% of the island's drinking water supply, addressing this issue will be critical to current and future drinking water needs are met. Several stakeholders commented that protection and improvement management of the NGLA should continue to be a high-priority management focus of land use planning efforts. Some stakeholders also noted that increased enforcement of existing watershed management plans and policies would support this objective.

3. Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
Extent of / opportunities for coral and storm surge protection and nature-based solutions	Updated models re coral health and role in storm surge attenuation? (current data from UN Atlas of the Ocean, 2000); assessment and valuation of NbS costs and benefits
Correlations between fires and floods	DOI-funded Piti-Asan study will assess this relationship further in the upcoming planning cycle

In-Depth Management Characterization:

Purpose: To determine the effectiveness of management efforts to address identified problems related to the coastal hazards enhancement objective.

1. For each coastal hazard management category below, indicate if the approach is employed by the state or territory and if there has been a significant change since the last assessment.

Significant Changes in Coastal Hazards Statutes, Regulations, and Policies

Management Category	**Employed by State/Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Change Since the Last Assessment** (Y or N)
Shorefront setbacks/no build areas	Y	Y	N – 3m public access and 25 ft setback unchanged
Rolling easements	N	N	N
Repair/rebuilding restrictions	N	N	N
Hard shoreline protection structure restrictions	N	N	N
Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)	N	N	N
Repair/replacement of shore protection structure restrictions	N	N	N
Inlet management	N	N	N
Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)	Y	Y	Y
Repetitive flood loss policies (e.g., relocation, buyouts)	N	N	N
Freeboard requirements	N	N	N
Real estate sales disclosure requirements	N	N	N
Restrictions on publicly funded infrastructure	N	N	N
Infrastructure protection (e.g., considering hazards in siting and design)	N	N	N
Other (please specify)			

Significant Changes to Coastal Hazard Management Planning Programs or Initiatives

Management Category	**Employed by State/Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Change Since the Last Assessment** (Y or N)
Hazard mitigation plans	Y	Y	Y
Sea level rise/Great Lake level change or climate change adaptation plans	Y	Y	Y
Statewide requirement for local post-disaster recovery planning	N	N	N
Sediment management plans	N	N	N
Beach nourishment plans	N	N	N
Special Area Management Plans (that address hazards issues)	Y	Y	Y
Managed retreat plans	N	N	N
Other (please specify)			

Significant Changes to Coastal Hazard Research, Mapping, and Education Programs or Initiatives

Management Category	**Employed by State/Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Change Since the Last Assessment** (Y or N)
General hazards mapping or modeling	Y	Y	Y
Sea level rise mapping or modeling	Y	Y	Y
Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)	Y	Y	Y
Hazards education and outreach	Y	Y	Y
Other (please specify)			

2. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state's management efforts in addressing coastal hazards since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state's management efforts?

No studies have been done to specifically address the effectiveness of the state's management efforts in addressing coastal hazards since the last assessment. However, as discussed in the Phase I assessment section, the updated Guam Hazard Mitigation Plan as well as the 2019 Sea Level Rise and Social Vulnerability Assessment provide updated information to support risk- and geographically-specific coastal risk reduction planning efforts further in this upcoming planning cycle.

Identification of Priorities:

1. Considering changes in coastal hazard risk and coastal hazard management since the last assessment and stakeholder input, identify and briefly describe the top one to three management

priorities where there is the greatest opportunity for the CMP to improve its ability to more effectively address the most significant hazard risks. *(Approximately 1-3 sentences per management priority.)*

Management Priority 1: Adopt policies and support regulatory updates to reduce risk of coastal hazards including terrestrial and coastal flooding, fires, and landslides.

Description: Currently coastal hazards are not uniformly addressed. Getting all resource managers on the same page regarding approach to development specific to stormwater management and flood hazard control, as well as supporting efforts to consider and minimize risks for new development and prioritize critical infrastructure for relocation would require updated policies and potentially legislation. However, such alignment would pay dividends in improved outcomes for coastal resources and communities.

Management Priority 2: Align Planning Frameworks to address Priority High Hazard Mitigation needs

Description: Funding is limited and investment in protection, rehabilitation, or relocation of critical infrastructure is a high priority. Through codification of existing planning efforts such as the Land Master Plan and Capital Improvement Plan that include mechanisms to assess, rank, and implement high priority adaptation needs, BSP can support the deployment of cost-effective master planning that ensures investments in high hazard areas considers and incorporates current and future environmental constraints in a comprehensive manner. Further prioritization of capital improvement program projects can further ensure that investments in natural and engineered solutions protect vulnerable infrastructure and communities.

Management Priority 3: Geospatial assessment tool, training, and capacity building

Description: Continued development of decision support tools and centralized geospatial databases will be critical to identifying and supporting efforts to avoid, minimize, and mitigate risks, especially in identified “high risk” areas. Where possible, best available data should be incorporated into planning and project scoping efforts to support risk reduction efforts for people, the built, and the natural environment.

2. Identify and briefly explain priority needs and information gaps the CMP has for addressing the management priorities identified above. The needs and gaps identified here should not be limited to those items that will be addressed through a Section 309 strategy but should include any items that will be part of a strategy.

Priority Needs	**Need?** (Y or N)	**Brief Explanation of Need/Gap**
Research	Y	New flood data, assessment of returns on investment / BCA to support prioritization and intervention decision making; shoreline loss and economic impacts
Mapping/GIS/modeling	Y	Decision support tools w/ geospatial integration; New data provided, opportunity to include in updated hazards mapping / decision support tool? Other mapping updates pending -> possible to leverage RiskMAP and other ongoing assessments to incorporate and support program change?
Data and information management	Y	Centralization of data and information sharing early in the planning or project scoping process is critical. Consider pursuing 312 Assessment Recommendation that the coastal program should convene pre-application meetings and monthly project review meetings and

Priority Needs	**Need?** (Y or N)	**Brief Explanation of Need/Gap**
		identify other issue areas where the program might coordinate or convene stakeholders and resource management agencies
Training/Capacity building	Y	Training regarding planning concepts and supporting tools has been regularly identified as a priority by BSP's network agency partners
Decision-support tools	Y	Decision support tools w/ geospatial integration has been frequently noted as a need to support planning and project scoping activities
Communication and outreach	Y	Risk communication and outreach will be necessary to building community understanding and support of coastal hazard risk reduction efforts
Other (specify)		

Enhancement Area Strategy Development:

1. Will the CMP develop one or more strategies for this enhancement area?

Yes __X___

No _____

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

Coastal hazards have been increased to a "high" priority in this 309 assessment in part due to the interconnection between increasing risks of natural hazard events and the flooding, stormwater, and nonpoint source pollution management challenges identified in the CSI enhancement area. Additionally, due to ongoing floodzone reassessment and management efforts and revised risk data for fires and associated landslides, viability of implementing a special area management planning approach for coastal hazards areas will be assessed further this 309 cycle. At minimum, coastal hazards considerations will be incorporated into plan revisions and codification efforts that this 309 Report will develop a strategy to address further.

Cumulative and Secondary Impacts

In-Depth Resource Characterization:

Purpose: To determine key problems and opportunities to improve the CMP's ability to address cumulative and secondary impacts of coastal growth and development.

1. What are the three most significant existing or emerging cumulative and secondary stressors or threats within your coastal zone? Indicate the geographic scope of the stressor, i.e., is it prevalent throughout the coastal zone, or are there specific areas that are most threatened? Stressors can be coastal development and impervious surfaces; polluted runoff; agriculture activities; forestry activities; shoreline modification; or other (please specify). Coastal resources and uses can be habitat (wetland or shoreline, etc.); water quality; public access; or other (please specify). When selecting significant stressors, also consider how climate change may exacerbate each stressor.

	Stressor/Threat	**Coastal Resource(s)/Use(s) Most Threatened**	**Geographic Scope** (throughout coastal zone or specific areas most threatened)
Stressor 1	Stormwater Runoff; flooding	Coral reef, aquatic resources, water quality, Northern Guam Lens Aquifer	Throughout the coastal zone
Stressor 2	Coastal Development	Habitat (Shorelines) native forest, wetlands, public access, aquifer	Throughout CZ, especially N. Guam and Tumon MPA
Stressor 3	Invasive Species	Native forest- terrestrial habitat	Throughout the island

2. Briefly explain why these are currently the most significant cumulative and secondary stressors or threats from coastal growth and development within the coastal zone. Cite stakeholder input and/or existing reports or studies to support this assessment.

The most significant cumulative and secondary stressors are primarily due to increased development and inadequate stormwater management systems. Numerous stakeholder surveys from this assessment period indicated – in fact, "flooding", "stormwater", or "erosion", were mentioned in seven of the sixteen responses describing the "greatest problem" to the respondent's "Priority 1" enhancement area. Due to the comparatively small size of the island, development continues to pose management challenges for sensitive terrestrial and marine habitats, the species that rely on them, and the ecosystem services they provide.

Although no stakeholder specifically identified invasive species as a specific threat or stressor, one respondent identified the need to protect native vegetation and promote low impact development as management challenges, and several respondents noted the importance of protecting habitats. The recent USACE flood hazard assessment reports further emphasize the connection between protection of native species and habitat when they identified a significant correlation between loss of native forest and changes in watershed vegetation and structure that contribute to and compound flood risks. Although mentioned specifically in terms of terrestrial habitat, control of invasive species in the marine environment is also an important CSI consideration that is mentioned as supporting ecosystem functions and values in both coral reef and marine conservation management plans.

3. Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
Extent of compounding CSI threats and impacts to coastal resources from climate change	Analysis and where necessary collection of localized data can help resource managers understand what impacts are already occurring and further assess and prioritization implementation of adaptation and mitigation options

In-Depth Management Characterization:

Purpose: To determine the effectiveness of management efforts to address identified problems related to the cumulative and secondary impacts (CSI) enhancement objective.

1. For each additional cumulative and secondary impact management category below that is not already discussed as part of the Phase I assessment, indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred since the last assessment.

Significant Changes to Management of Cumulative and Secondary Impacts of Development

Management Category	**Employed by State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
Methodologies for determining CSI impacts	N	N	N
CSI research, assessment, monitoring	N	N	N
CSI GIS mapping/database	N	N	N
CSI technical assistance, education and outreach	Y	Y	Y – Stormwater guidance updates and management efforts underway
Other (please specify)			

2. For management categories with significant changes since the last assessment, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information.

a. Describe significant changes since the last assessment;

b. Specify if they were 309 or other CZM-driven changes; and

c. Characterize the outcomes or likely future outcomes of the changes.

Although not a 309 or CZM-driven change, perhaps one of the most significant updates related to CSI in this last reporting period was the 2018 issuance of the Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) permit for Guam's Department of Public Works (GDPW) (NPDES Permit No. GUS040001, Dec. 20, 2018). Although not including military installations and classifying GDPW's discharge facilities as "minor", the permit nevertheless requires that GDPW "effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are authorized by a separate NPDES permit or not prohibited".[79] Any category of non-stormwater discharge occurring within DPW's jurisdiction must be addressed as an "illicit discharge", which DPW must address through the development of an "Illicit Discharge Detection and Elimination System" (IDDE). DPW must develop a program to detect, investigate, and illuminate "non-stormwater" discharges which can include street wash water and other "non-incidental" sources to the MS4. Within four years of the permit becoming effective – starting February 1, 2019 – DPW must develop and implement an IDDE program to implement best management practices and achieve measurable goals. These efforts will be supported by the development of a geographic information system (GIS) based map that will include surface and subsurface features within two years and identifies priority outfalls within three years. While this permit is intended to support DPW's efforts to reduce the discharge of pollutants from the MS4 "to the maximum extent practicable" to protect water quality and satisfy the requirements of the Clean Water Act, the development and implementation of the stormwater management program (SWMP) requirement by this permit which includes meeting programmatic development as well as regular monitoring and reporting requirements will be labor intensive and costly.

In September 2020 the U.S. Environmental Protection Agency announced Guam would receive nearly $10 Million in funding from the State Revolving Fund to support water infrastructure and management needs including:

- $6,096,000 from the Clean Water Stet Revolving Fund to support wide range of water infrastructure projects, including modernizing aging wastewater infrastructure, implementing water reuse and recycling and addressing stormwater; and
- $3,856,000 from the Drinking Water State Revolving Fund to help drinking water systems install treatment for contaminants, improve distribution systems by removing lead service lines and strengthen system resiliency to natural disasters such as floods.[80]

Although this funding will help address critical system upgrades, additional investments will be needed to maintain and expand water, wastewater, and stormwater management systems and comply with new MS4 management program development and monitoring requirements. Interagency management planning efforts continue to work to address multi-jurisdictional nonpoint source pollution challenges. However, as noted by one survey respondent, these efforts can be frustrated by at times conflicting guidance.[81]

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[79] USEPA, *Guam Department of Public Works MS4 NPDES Permit No. GUS040001,* at pg. 5.
[80] USEPA News Release, Sept. 16, 2020, https://www.epa.gov/newsreleases/epa-awards-nearly-10-million-infrastructure-protect-surface-waters-and-drinking-water.
[81] 2020 Assessment comments regarding opportunities for CSI include: "Assist DPW in their newly given responsibility to discharge storm drainage from roadways into the ocean"; and "stormwater management manuals vary and developers pick and choose which manual that best suits their project. 1) CNMI Guam Stormwater Management Manual; 2) Guam Transportation Stormwater Drainage Manual". One respondent indicated that a successful 5-year outcome for their "Priority 1 enhancement area" would be "Updated statutes and regulations delineated agency responsibilities for stormwater, for new development, retroactive standards for old development, and requirements for public infrastructure. A heightened awareness of public drainage and stormwater quality infrastructure leading to funding. Stronger enforcement of rules including increased staffing for GEPA and the ability for GCMP to assist in enforcement of stormwater rules."

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state's or territory's management efforts in addressing cumulative and secondary impacts of development since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state and territory's management efforts?

CSI and Water Quality

While "CSI" describes a large range of potential impacts, concerns regarding water quality, high value habitat and ecosystem functions, and risks to people and property were consistently raised in the stakeholder surveys and follow-up interviews. Although numerous management efforts are underway to address non-point source pollution that includes sedimentation, runoff, and erosion often associated with CSI, GEPA's 2018 Integrated Report, as well as the updated watershed management studies for the Tamunig/Tumon and Manell-Geus watersheds indicate there are still challenges to achieving water quality management goals.

In 2010, Guam had 47 "Impaired" or 303(d)-listed sites.[82] The "303(d)" listing indicates water quality pollutant exceedances which result in not meeting at least one of the designated water quality uses, requiring the development of a "Total Maximum Daily Load" (TMDL). The 2018 IR, 55 sites were included on the "303(d)" list. A comparison of Guam's 2016 and 2018 305(b) assessment and 303(d) impairment list indicates that 40 of the "impaired" site listings were carry-overs from the 2016 report.

The USEPA Assessment, Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS), an online system for accessing information about the conditions in the Nation's surface waters, visualizes these impairment trends from the 2016 IR as shown on the following pages.[83] A trends analysis is not yet available for the 2018 IR, however, the chart that follows below compares 2010 to 2016 data. In both 2010 and 2016, leading causes of impairment remained turbidity for rivers and streams, PCBs for bays and estuaries as well as wetlands, and *Enterococcus* pathogens as the leading cause of impairment for coastal waters.

Analysis of the 2016 IR indicates that of the 23% of all rivers and streams that were assessed, 61.5% were impaired, and of those, 65.9% had TMDLs in place. Turbidity was the leading cause of impairment. Of the 2.4% of assessed bays and estuaries, 66.2%, or 14.8 square miles, were listed as impaired and no TMDL was developed as of 2016. The leading cause of impairment of polychlorinated biphenyls (PCBs) identified in fish tissue, followed by impairments from identified pesticides, toxic inorganics including trichloroethylene (TCE), tetrachloroethylene, and metals other than mercury. Of the 14.2% or 16.6 miles of assessed shorelines, 100% were identified as impaired, and TMDLs were in place for 96.1% of these segments. The leading cause of shoreline water quality impairment was due to detection of *Enterococcus* bacteria. Of the 1,795.4 acres of identified wetlands, only 6.4 acres were assessed with 100% impairment reported due to PCBs and no TMDL completed.

The CSI enhancement objective is to enable the assessment, consideration, and control of cumulative and secondary impacts of coastal growth and development, including the collective effects on various

[82] National Summary of Impaired Waters and TMDL Information, USEPA, available at http://iaspub.epa.gov/waters10/attains_nation_cy.control?p_report_type=T.
[83] ATTAINS water quality monitoring data for Guam is available at https://iaspub.epa.gov/waters10/attains_state.control?p_state=GU#total_assessed_waters.

individual uses or activities on coastal waters such as coastal wetlands and fisheries resources. Although there are significant connections between CSI and watershed management plans due to correlations between landcover and water quality impacts, these details are discussed further in the SAMP Phase II assessment. Similarly, although there are relationships between the shocks and stressors described in the Coastal Hazards Phase II assessment, particularly in regards to cumulative sedimentation, erosion, and water quality impacts that can be caused by storms, fires, and floods that have long-term implications for CSI, the update on program changes relevant to these impacts in detailed in the Coastal Hazards section. While additional data may be helpful to further track trends, the GEPA water quality reports support informative long-term data analysis for shorelines, bays and estuaries, and rivers and streams that indicate ongoing CSI management challenges. During this review, discrepancies with wetland reporting were identified that may support reassessment of that enhancement area for re-prioritization in a subsequent planning cycle. Lacking ground-truth data and wetland ranking system, and given the limited water quality data on these systems in the GEPA water quality reports, it is difficult to assess to what extent wetlands within the coastal zone are being impacted by cumulative and secondary impacts including water quality and habitat degradation.

Although watershed management studies were developed for the Tamunig/Tumon and Manell-Geus watersheds in the last reporting period and do help to identify watershed specific challenges, and provide valuable models that project flood extents, the Army Corps flood management studies did not include actionable discussions regarding "lessons learned" that could be developed further into CSI Guidance. Lacking data regarding specific impacts and assessment of watershed-wide development impacts as well as infrastructure improvement timelines, CSI guidance developed under "Phase II" of the previous 309 was limited to conceptual best management practices for site development. In the 2020 assessment, stakeholders recommended that GCMP "continue to facilitate government-wide efforts" to address stormwater and promote low impact development.

	Rivers & Streams Assessed	Rivers & Streams Impaired	Rivers & Streams w/ TMDL	Bays & Estuaries Assessed	Bays & Estuaries Impaired	Bays & Estuaries w/ TMDL	Shorelines Assessed	Shorelines Impaired	Shorelines w/ TMDL	Wetlands Assessed	Wetlands Impaired	Wetlands w/ TMDL	Leading Impairments
2010 IR	37%	34.2%	74.5%	3.8%	42%	0%	13.8%	100%	96%	0.4%	100%	0%	Turbidity, PCBs, *E. coli*
2016 IR	23%	61.5%	65.9%	2.4%	66.2%	0%	14.2%	100%	96.1%	0.4%	100%	0%	Turbidity, PCBs, *E. coli*

Site-specific Targeted Monitoring Summary Results

Guam (2010)

Description of this table

	Size of Water			
	Rivers and Streams (Miles)	Bays and Estuaries (Square Miles)	Coastal Shoreline (Miles)	Wetlands (Acres)
Good Waters	55.7	20.4		
Previously impaired waters now attaining all uses				
Threatened Waters				
TMDL completed				
TMDL alternative				
Non-pollutant impairment				
TMDL needed				
Impaired Waters	29.0	14.8	16.1	6.4
TMDL completed	21.6		5.8	
TMDL alternative				
Non-pollutant impairment				
TMDL needed	7.4	14.8	10.3	6.4
New TMDLs completed	.0	.0	9.7	.0
Remaining TMDLs needed	7.4	14.8	.7	6.4
Total Assessed Waters	84.7	35.1	16.1	6.4
Total Waters	228.7	915.0	116.5	1,795.4
Percent of Waters Assessed	37.0	3.8	13.8	.4

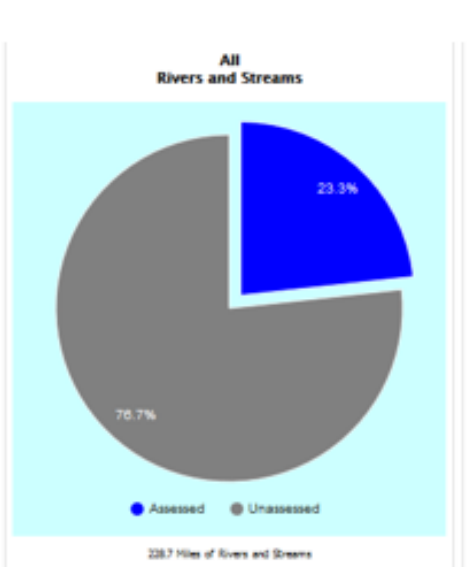
Site-specific Targeted Monitoring Summary Results

Guam (2016)

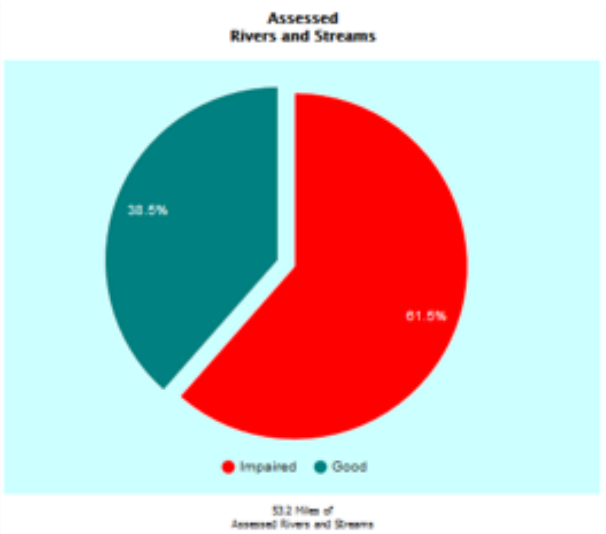
Description of this table

	Size of Water			
	Rivers and Streams (Miles)	Bays and Estuaries (Square Miles)	Coastal Shoreline (Miles)	Wetlands (Acres)
Good Waters	20.5	7.6		
Previously impaired waters now attaining all uses				
Threatened Waters				
TMDL completed				
TMDL alternative				
Non-pollutant impairment				
TMDL needed				
Impaired Waters	32.7	14.8	16.6	6.4
TMDL completed	21.6		15.9	
TMDL alternative				
Non-pollutant impairment				
TMDL needed	11.2	14.8	.7	6.4
New TMDLs completed	.0	.0	.0	.0
Remaining TMDLs needed	11.2	14.8	.7	6.4
Total Assessed Waters	53.2	22.3	16.6	6.4
Total Waters	228.7	915.0	116.5	1,795.4
Percent of Waters Assessed	23.3	2.4	14.2	.4

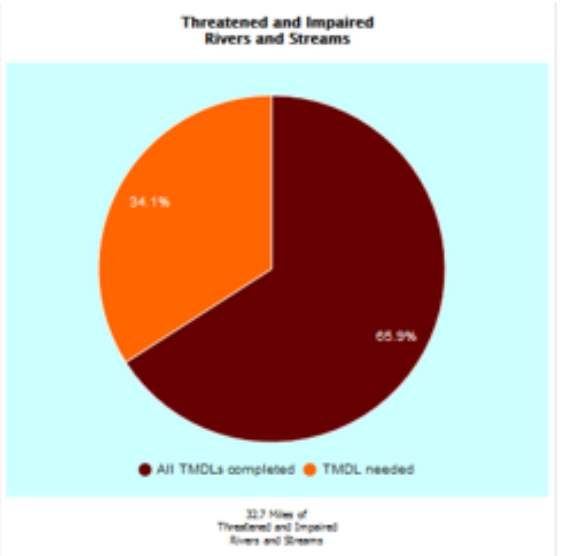
2016 ATTAINS DATA, USEPA



Assessed Status	Miles
Assessed	53.2
Unassessed	175.4
Total Miles	**228.7**



Attainment Status	Miles
Good	20.5
Threatened	.0
Impaired	32.7
Total Miles Assessed	**53.2**



TMDL Development Status	Miles
All TMDLs completed	21.6
TMDL alternative	.0
Non-pollutant impairment	.0
TMDL needed	11.2
Total Threatened and Impaired	**32.7**

Site-specific Targeted Monitoring Results

Individual Designated Use Support
Guam Rivers and Streams 2016

* Waters assessed for more than one designated use are included in multiple designated use groups below.

Description of this table

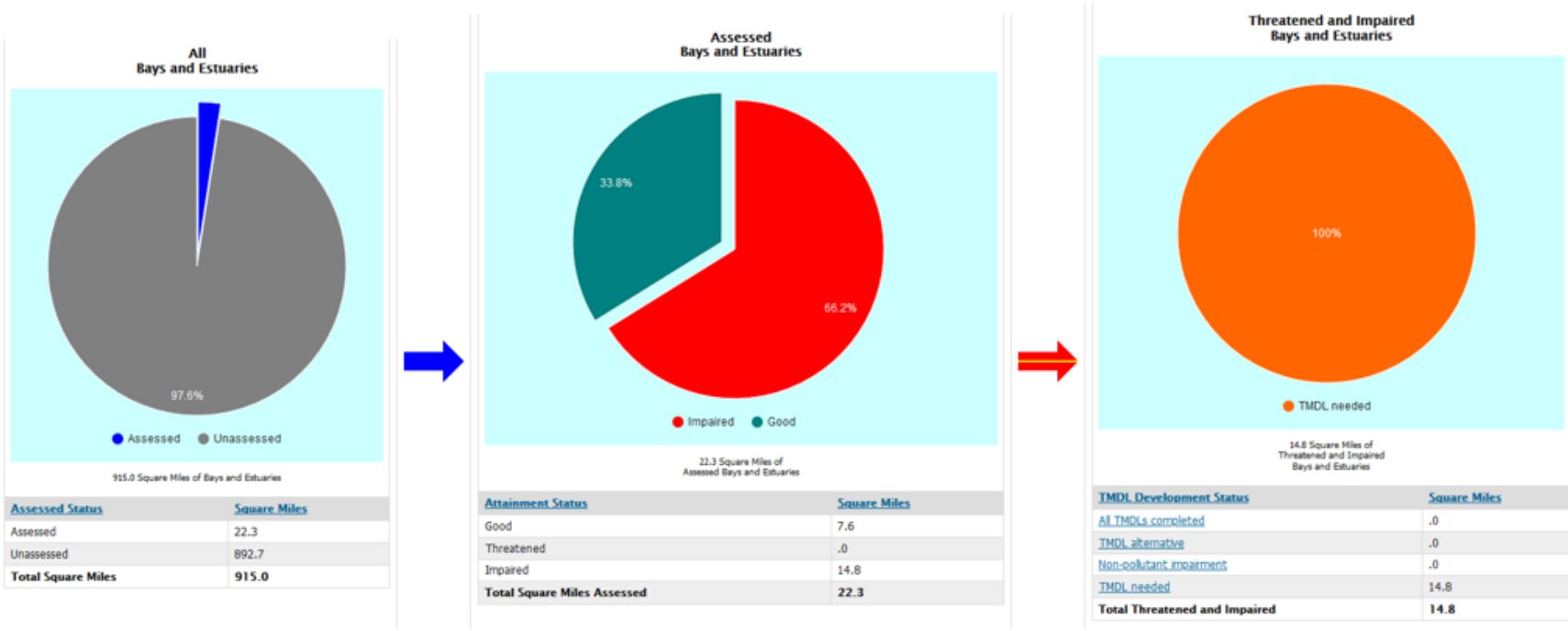
Designated Use	Miles Assessed	Percent Good	Percent Threatened	Percent Impaired	% Good / % Threatened / % Impaired
Aesthetic Enjoyment	4.9	.0	.0	100.0	
Aquatic Life	43.3	26.2	.0	73.8	
Consumption	42.0	85.5	.0	14.5	
Drinking Water	3.8	.0	.0	100.0	
Drinking Water (With Treatment)	1.1	.0	.0	100.0	
Limited Body Contact Recreation	14.2	66.6	.0	33.4	
Whole Body Contact Recreation	28.8	80.0	.0	20.0	

Site-specific Targeted Monitoring Results

Causes of Impairment
Guam Rivers and Streams 2016

Description of this table

Cause of Impairment	Cause of Impairment Group	Miles Threatened or Impaired
Turbidity	Turbidity	21.8
Escherichia Coli (E. Coli)	Pathogens	10.0
Dissolved Oxygen	Organic Enrichment/Oxygen Depletion	5.5
Enterococcus Bacteria	Pathogens	5.4
Nitrates	Nutrients	5.2
Salinity	Salinity/Total Dissolved Solids/Chlorides/Sulfates	5.1
Total Suspended Solids (TSS)	Turbidity	5.1
Zinc	Metals (other than Mercury)	4.9
Ammonia, Un-ionized	Ammonia	4.9
Manganese	Metals (other than Mercury)	4.9
Chromium, Total	Metals (other than Mercury)	4.9
Nickel	Metals (other than Mercury)	4.9
Copper	Metals (other than Mercury)	4.9
Iron	Metals (other than Mercury)	4.9
Total Dissolved Solids (TDS)	Salinity/Total Dissolved Solids/Chlorides/Sulfates	4.9
Total Coliform	Pathogens	4.9
Temperature, Water	Temperature	4.9
Aluminum	Metals (other than Mercury)	4.9
PCB(s) in Fish Tissue	Polychlorinated Biphenyls (PCBs)	1.2



Assessed Status	Square Miles
Assessed	22.3
Unassessed	892.7
Total Square Miles	**915.0**

Attainment Status	Square Miles
Good	7.6
Threatened	.0
Impaired	14.8
Total Square Miles Assessed	**22.3**

TMDL Development Status	Square Miles
All TMDLs completed	.0
TMDL alternative	.0
Non-pollutant impairment	.0
TMDL needed	14.8
Total Threatened and Impaired	**14.8**

Site-specific Targeted Monitoring Results

Individual Designated Use Support
Guam Bays and Estuaries 2016

* Waters assessed for more than one designated use are included in multiple designated use groups below.

Description of this table

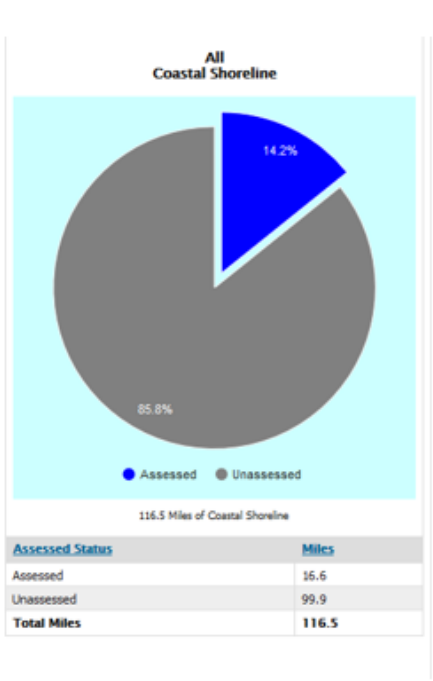
Designated Use	Square Miles Assessed	Percent Good	Percent Threatened	Percent Impaired	% Good / % Threatened / % Impaired
Aquatic Life	21.0	87.3	.0	12.7	
Consumption	18.0	21.8	.0	78.2	
Limited Body Contact Recreation	.4	100.0	.0	.0	
Whole Body Contact Recreation	19.1	96.3	.0	3.7	

Site-specific Targeted Monitoring Results

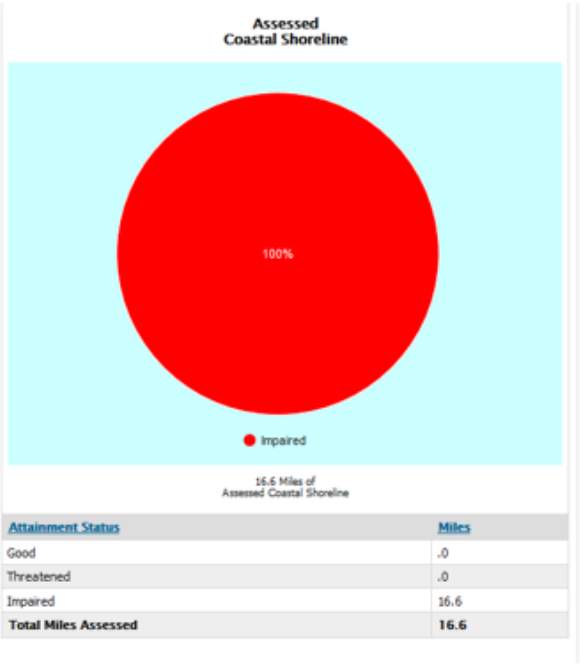
Causes of Impairment
Guam Bays and Estuaries 2016

Description of this table

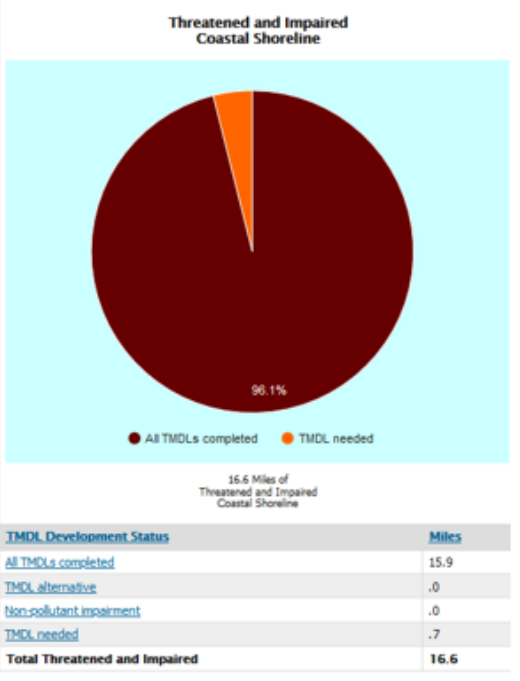
Cause of Impairment	Cause of Impairment Group	Square Miles Threatened or Impaired
PCB(s) in Fish Tissue	Polychlorinated Biphenyls (PCBs)	11.7
Antimony	Toxic Inorganics	2.0
Chlordane	Pesticides	2.0
Arsenic	Metals (other than Mercury)	2.0
Tetrachloroethylene	Toxic Organics	2.0
Dieldrin	Pesticides	2.0
Trichloroethylene (TCE)	Toxic Organics	2.0
Dissolved Oxygen	Organic Enrichment/Oxygen Depletion	.7
Enterococcus Bacteria	Pathogens	.7
Nitrates	Nutrients	.7
Dioxin (Including 2,3,7,8-TCDD)	Dioxins	.6
Chlordane in Fish Tissue	Pesticides	.6
Toxic Seafood Advisory (Seaweed)	Other Cause	.4



Assessed Status	Miles
Assessed	16.6
Unassessed	99.9
Total Miles	**116.5**



Attainment Status	Miles
Good	.0
Threatened	.0
Impaired	16.6
Total Miles Assessed	**16.6**



TMDL Development Status	Miles
All TMDLs completed	15.9
TMDL alternative	.0
Non-pollutant impairment	.0
TMDL needed	.7
Total Threatened and Impaired	**16.6**

Site-specific Targeted Monitoring Results

Individual Designated Use Support
Guam Coastal Shoreline 2016

* Waters assessed for more than one designated use are included in multiple designated use groups below.

Description of this table

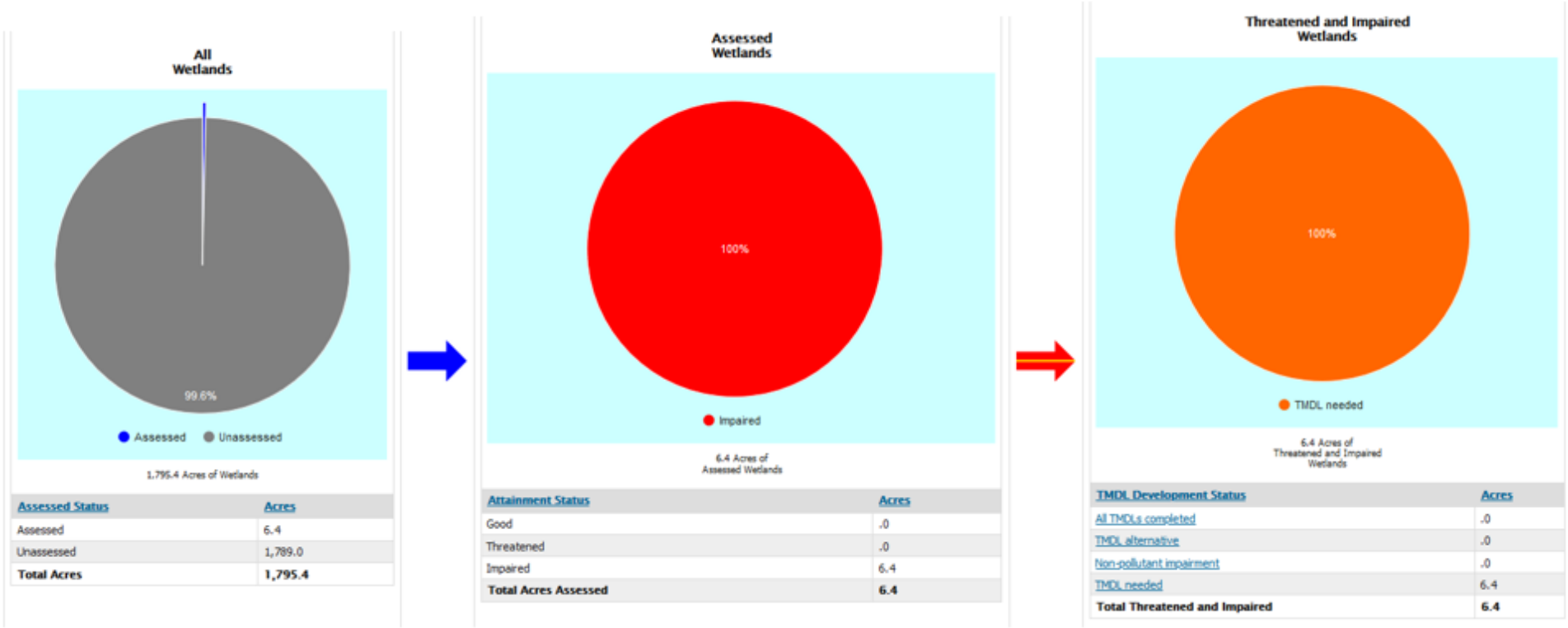
Designated Use	Miles Assessed	Percent Good	Percent Threatened	Percent Impaired	% Good / % Threatened / % Impaired
Consumption	.7	.0	.0	100.0	
Limited Body Contact Recreation	.5	.0	.0	100.0	
Whole Body Contact Recreation	15.5	.0	.0	100.0	

Site-specific Targeted Monitoring Results

Causes of Impairment
Guam Coastal Shoreline 2016

Description of this table

Cause of Impairment	Cause of Impairment Group	Miles Threatened or Impaired
Enterococcus Bacteria	Pathogens	15.9
PCB(s) in Fish Tissue	Polychlorinated Biphenyls (PCBs)	.7



Assessed Status	Acres
Assessed	6.4
Unassessed	1,789.0
Total Acres	**1,795.4**

Attainment Status	Acres
Good	.0
Threatened	.0
Impaired	6.4
Total Acres Assessed	**6.4**

TMDL Development Status	Acres
All TMDLs completed	.0
TMDL alternative	.0
Non-pollutant impairment	.0
TMDL needed	6.4
Total Threatened and Impaired	**6.4**

Site-specific Targeted Monitoring Results

Individual Designated Use Support
Guam Wetlands 2016

* Waters assessed for more than one designated use are included in multiple designated use groups below.

Description of this table

Designated Use	Acres Assessed	Percent Good	Percent Threatened	Percent Impaired	% Good / % Threatened / % Impaired
Consumption	6.4	.0	.0	100.0	

Site-specific Targeted Monitoring Results

Causes of Impairment
Guam Wetlands 2016

Description of this table

Cause of Impairment	Cause of Impairment Group	Acres Threatened or Impaired
PCB(s) in Fish Tissue	Polychlorinated Biphenyls (PCBs)	6.4

Identification of Priorities:

1. Considering changes in cumulative and secondary impact threats and management since the last assessment and stakeholder input, identify and briefly describe the top one to three management priorities where there is the greatest opportunity for the CMP to improve the effectiveness of its management effort to better assess, consider, and control the most significant threats from cumulative and secondary impacts of coastal growth and development. *(Approximately 1-3 sentences per management priority.)*

Management Priority 1: Support Policy and regulatory updates, alignment, and enhancements to address CSI focusing on resource- and area-specific environmental conditions and constraints.

Description: As discussed relevant to flooding the coastal hazards section, getting all resource managers on the same page regarding approach to development specific to stormwater management / flood hazard control. However, due to the connection between upper-watershed development and impacts such as fire and landslides to downgradient flooding and water quality impacts, comprehensive watershed management planning and implementation of best practices to support "low impact development" (LID) are needed to truly address CSI management issues.

Management Priority 2: Identify and adopt LID guidance and other BMPs to address resource- and area-specific stressors and threats through the further development and mainstreaming of geospatial information systems in planning and project development.

Description: Impacts associated with development, land use change, and intensive land use practices continue to present threats to coastal and marine resources. Lack of formal and uniform guidance regarding what development, redevelopment, and land use best practices are required or recommended to address existing environmental constrains has led to a lack of standardized use of permitting conditions or mitigation requirements. While it is important to maintain flexibility, having a list of best management practices to address common use conflicts and resource impact mitigation requirements would expedite project development and permit processing.

Management Priority 3: Support inter-agency coordination and community education to promote incorporation of LID and CSI reduction planning and project implementation efforts.

Description: Opportunities to build buy-in and collaborate in policy development to address CSI impacts include interagency forums such as the annual Assembly of Planners as well as ongoing RiskMAP hazard identification and communication efforts. These forums, however, require interagency commitments to continue collaborative management dialogs to support these efforts and implement their outcomes. Additionally, lack of support and capacity has made effective implementation of identified best management practices a challenge. Efforts to reduce cumulative and secondary impacts would be furthered through resource and region-specific planning that identifies and promotes wise resource use.

2. Identify and briefly explain priority needs and information gaps the CMP has to help it address the management priorities identified above. The needs and gaps identified here do not need to be limited to those items that will be addressed through a Section 309 strategy but should include any items that will be part of a strategy.

Priority Needs	**Need?** (Y or N)	**Brief Explanation of Need/Gap**
Research	Y	Ongoing research is needed to track water quality and land use change trends and support development of additional guidance
Mapping/GIS	Y	Need to ground truth and map wetlands, high hazard areas, and combine environmental (including water quality data) and infrastructure data to support planning, project scoping, and development needs
Data and information management	Y	Centralization of data and information sharing early in the planning or project scoping process is critical. Currently important environmental and infrastructure data are not easily accessible and available to decision-makers or developers
Training/Capacity building	Y	Training regarding planning concepts and supporting tools has been regularly identified as a priority by BSP's network agency partners
Decision-support tools	Y	Decision support tools w/ geospatial integration has been frequently noted as a need to support planning and project scoping activities
Communication and outreach	Y	Communication and outreach will be necessary to building community understanding and support of CSI responsive plans, policies, and regulations
Other (specify)		

Enhancement Area Strategy Development:

1. Will the CMP develop one or more strategies for this enhancement area?

Yes __X___

No _____

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

Ongoing research is needed to track water quality and land use change trends and support development of additional CSI guidance, however, sufficient management recommendations and BMPs have been identified for initial plan and regulatory updates. Because of the synergy between coastal hazards, stormwater and nonpoint source pollution, as well as resource-specific alignment with "special management areas" such as watersheds and high value coastal resources, this 309 Report will develop a strategy to address this enhancement area further.

Special Area Management Planning

In-Depth Resource Characterization:

Purpose: To determine key problems and opportunities regarding the preparation and implementation of special area management plans for important coastal areas.

1. What are the one to three most significant geographic areas facing existing or emerging challenges that would benefit from a new or revised special area management plan (SAMP) or better implementation of an existing SAMP? For example, are there areas where existing management approaches are not working and could be improved by better coordination across multiple levels of government? What challenges are these areas facing? Challenges can be a need for enhanced natural resource protection; use conflicts; coordinating regulatory processes or review; additional data or information needs; education and outreach regarding SAMP policies; or other (please specify). When selecting significant challenges, also consider how climate change may exacerbate each challenge.

	Geographic Scope (within an existing SAMP area (specify SAMP) or within new geographic area (describe new area))	**Challenges**
Geographic Area 1	Coral Reefs including Guam's MPAs, High-value reefs and FAD areas, Lagoons, Shoreline	Major issues include overharvesting, near-shore development, increased recreation, poor fishing practices, storms, shoreline erosion, flooding, non-point pollution. Management opportunities include Stormwater Management Guidance update, conservation plans, and watershed plans that are in development or that are development and pending codification into the Comprehensive Plan
Geographic Area 2	Fragile Areas (wetlands, limestone forest, wildlife habitats, high value reefs, and historic sites); N. Guam aquifer recharge area	Major issues include development, Military, Ancestral Lands and Chamorro Land Trust needs, water sports and tropical beach recreation, and outright vandalism, graffiti and theft of historic properties in historic sites. Management opportunities include ongoing conservation planning efforts which could be codified into the Comprehensive plan For the N. Aquifer, major issues include agriculture, development, overuse, military build-up, illegal dumping. Management opportunities include ongoing efforts to reduce and address impacts from development.
Geographic Area 3	Priority Watersheds (Piti- Asan, Manell-Geus, Pago Bay, Ugum, Fouha,Toguan)	Major issues include fires, increasing development, flooding, invasive species Management opportunities include mandates to develop and implement S. Guam watershed management plans and invest in nature-based and engineered solutions to reduce impacts of growth

2. Briefly explain why these are currently the most significant challenges that may require developing a new SAMP, or revising or improving implementation of an existing SAMP. Cite stakeholder input and/or existing reports or studies to support this assessment.

Several stakeholders commented that some development management issues could be appropriately addressed through revisions to the Seashore Reserve Management Plan which are currently ongoing. Codification of existing as well as pending resource- and species-focused conservation action plans will support comprehensive management mandates. However, risk-reduction planning efforts that aim to address vulnerabilities to a more widely defined set of coastal hazards that include consideration of fire-prone areas and sleep slopes that pose higher risks of erosion or landslides may be warranted.

3. Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
"High risk" SMAs	Incorporate fire, landslide, and flooding and water quality data for enhanced vulnerability mapping and development of BMPs for "high risk" special management areas

In-Depth Management Characterization:

Purpose: To determine the effectiveness of management efforts to address identified problems related to the special area management planning enhancement objective.

1. For each additional SAMP management category below that was not already discussed as part of the Phase I assessment, indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred since the last assessment.

Significant Changes Related to Special Area Management Panning

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
SAMP research, assessment, monitoring	Y	Y	Y
SAMP GIS mapping/database	Y	Y	N
SAMP technical assistance, education, and outreach	Y	Y	N
Other (please specify)			

2. For management categories with significant changes since the last assessment, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information.
    a. Describe significant changes since the last assessment;
    b. Specify if they were 309 or other CZM-driven changes; and

c. Characterize the outcomes or likely future outcomes of the changes.

Changes regarding SAMP management polices and plans for coral reefs, priority watersheds, and the Northern Guam Lens Aquifer are detailed in the Phase I assessment. As also discussed there, the recent adoption of the comprehensive Guam Green Growth (G3) initiative offers opportunities to support expanded interagency coordination and resource management efforts. While this G3 effort was not 309 or CZM-driven, it was supported by BSP-GCMP as well as numerous GovGuam, private-sector, and non-profit partners. Building from this momentum and current focus on comprehensive sustainable development planning and project implementation signals likely political support to enable a more comprehensive approach to integration of SAMP into Guam's Comprehensive Development Plan.

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state's or territory's special area management planning efforts since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state's or territory's management efforts?

Numerous studies and reports discussed in the Phase I SAMP section indicate increasing impermeable cover. Coupled with discussion of water quality trends in the Wetlands and CSI sections, as well as increasing chloride levels and recent sea level rise projections in the 2019 SLR and Social Vulnerability Assessment as well as continued coral bleaching and fisheries decline, all indicates that current management policies recommendations are not achieving intended outcomes for coastal resources.

Identification of Priorities:

1. Considering changes with coastal resource protection or coastal use conflicts within defined geographic areas, special area management planning activities since the last assessment, and stakeholder input, identify and briefly describe the top one to three management priorities where there is the greatest opportunity for the CMP to improve their ability to prepare and implement special area management plans to effectively manage important coastal areas. *(Approximately 1-3 sentences per management priority.)*

   Management Priority 1: Update the Guam Comprehensive Plan with revised watershed and other special area management plans and incorporate current development standards and best management practices to unify and streamline growth guidance in SAMPs.

   Description: SAMPs can include natural and cultural resources as well as watersheds, special use areas, and high hazard or risk reduction zones. Many of these plans exist or are being created and will soon be finalized. These watershed, hazard mitigation, stormwater management, and conservation plans all include planning elements identified in Guam's Comprehensive Development Plan (GCDP) connect to these special management considerations, however, an update of the GCDP must be executed (eg approved by the Legislature and the Governor) in order for these plans and policies to be enforceable. This is a cross-cutting management priority. Protections will be achieved by establishing conservation districts and/or "special management areas" under the Guam Comprehensive Development Plan through the adoption and codification of specific resource- and area-specific management plans.

Management Priority 2: Ensure enforceability of codified planning elements.

Description: To support risk reduction efforts and protect high value and threatened ecosystems and their services, new enforcement authorities or expanded coordination with regulatory agencies that are charged with enforcement of existing resource management mandates must be prioritized to achieve prioritized management outcomes.

Management Priority 3: Support inter-agency coordination and community education to promote SAMP management objectives.

Description: Opportunities to build buy-in and collaborate in policy development to support and mainstream SAMP plans and implementation needs include interagency forums such as the annual Assembly of Planners. However, development of plans and policies and related training and capacity building efforts require interagency commitments to continue collaborative management dialogs. Additionally, staff turnover and lack of support and capacity have made knowledge retention and information sharing challenging. Ensuring GovGuam leadership and agency staff as well as the public and private sectors understand these efforts will be critical to successfully updating and implementing revised special area management planning elements through the Comprehensive Plan.

2. Identify and briefly explain priority needs and information gaps the CMP has to help it address the management priorities identified above. The needs and gaps identified here do not need to be limited to those items that will be addressed through a Section 309 strategy but should include any items that will be part of a strategy.

Priority Needs	**Need?** (Y or N)	**Brief Explanation of Need/Gap**
Research	Y	WERI research ongoing but funding is limited; other needs include area-specific impact assessments, some of which are ongoing. Understanding source and amount of storm water directly entering Tumon Bay. Innovative solutions to manage storm water in low lying areas and areas at sea level. Impact from climate change and sea level rise to infrastructure located underground and to hotels. Pilot project to test innovative products such as pervious cement to manage flooding.
Mapping/GIS	Y	Guam "SuperMap" and watershed specific mapping exist but limited layers / application; Updated GIS data to include land use and impervious surface cover, soil types, water quality impairment areas, and other environmental conditions would significantly benefit planning, permitting, and enforcement. Location of stormwater infrastructure, land ownership, shoreline change could be included to also connect to CSI assessment parameters.
Data and information management	Y	Several organizations or agencies collect and regularly publish data but these reports are siloed – for example, WERI publishes annual reports for N. Aquifer; GEPA periodically updates water quality data, but these sources must be combined to better understand trends. A

Priority Needs	Need? (Y or N)	Brief Explanation of Need/Gap
		centralized data library including historic data, access to must current GIS, and metadata that includes scheduled updates to data sets would be a helpful coastal resources assessment and management tool.
Training/Capacity building	Y	Numerous respondents emphasized the need for training regarding the role of ecosystems (eg wetlands, shorelines, reefs) in coastal protection, BMPs in stormwater management, and additional capacity building across agencies. Needs also include training on stormwater BMP for contractors, coral reef, and watershed-specific environmental impacts and constraints could further support expanded understanding and implementation of guidance.
Decision-support tools	Y	2020 BSP Program report indicated opportunities to build out GIS tools for decision-support in planning, permitting, and enforcement. Stakeholders also suggested potential applications of GIS based tools for determining areas of future growth such as 3-D modeling for siting of future development, and determining increase flooding potential. Currently GIS staffing is limited so expanded human capacity, training, and, hardware/software to support these recommendations would be needed.
Communication and outreach	Y	Additional communications and outreach support and coordination are needed to unify messaging, address knowledge gaps, and enhance management approaches. Information should be translated for the public so they can more readily understand the impact of additional pervious surfaces and other land use and resource management decisions on resources of concern. See also notes on "training".
Other (specify)		

Enhancement Area Strategy Development:

1. Will the CMP develop one or more strategies for this enhancement area?

Yes __X___

No _____

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

Special Area Management Planning approaches are already in place and can be strengthened through codification to address leading resource- and area-specific threats identified in this enhancement area. Strategies to implement SAMP also relate to CSI and Coastal Hazard management needs, therefore, these needs can be addressed concurrently and efficiently in the upcoming planning cycle. Strategies will be developed with this goal in mind.

IV. Strategy

Strategy #1: Special Area Management Codification

I. Issue Area(s)

The proposed strategy or implementation activities will support the following high-priority enhancement areas *(check all that apply)*:

- ☐ Aquaculture
- ☐ Energy and Government Facility Siting
- ☒ Coastal Hazards
- ☐ Ocean/Great Lakes Resources
- ☒ Special Area Management Planning
- ☒ Cumulative and Secondary Impacts
- ☐ Wetlands
- ☐ Marine Debris
- ☐ Public Access

II. Strategy Description

A. *The proposed strategy will lead to, or implement, the following types of program changes (check all that apply):*

☐ A change to coastal zone boundaries;

☐ New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;

☐ New or revised local coastal programs and implementing ordinances;

☐ New or revised coastal land acquisition, management, and restoration programs;

☒ New or revised special area management plans (SAMP) or plans for areas of particular concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

☒ New or revised guidelines, procedures, and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government, and other agencies that will result in meaningful improvements in coastal resource management.

B. *Strategy Goal:*

State the goal of the strategy for the five-year assessment period. The goal should be the specific program change to be achieved or be a statement describing the results of the project, with the expectation that achieving the goal would eventually lead to a program change. For strategies that implement an existing program change, the goal should be a specific implementation milestone. For example, work with three communities to develop revised draft comprehensive plans that consider future sea level rise or, based on research and policy analysis, present proposed legislation on

wetland buffers to state legislature for consideration. Rather than a lofty statement, the goal should be achievable within the time frame of the strategy.

The goal of the 2020-2025 Strategy 1: Special Area Management Codification is to codify conservation districts as planning elements under the BSP administered Comprehensive Development Plan to articulate and unify policies for smart coastal development in conservation areas, including but not limited to soil, water, forest, and high hazard risk management areas to protect people, property, and coastal resources on Guam.

C. *Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change.*

(Note that implementation strategies are not to exceed two years.)

GCMP has spent the previous Section 309 (2015-2020) cycle developing decision support tools and policies specific to cumulative and secondary impacts, as well as facilitating the development of resource and area-specific plans and policies. However, BSP-GCMP has limited ability to enforce these planning documents without their incorporation as planning elements into the Comprehensive Development Plan. This process requires endorsement by the Governor and legislative approval to update planning elements. However, given the considerable efforts that have been devoted to plan development and the increasing need to more proactively implement best practices and growth guidelines to ensure protection of fragile and increasingly threatened resources this proposed program change is timely. It is also well supported by agency partners and leadership, as evidenced in the 2020 BSP-GCMP Program Assessment Report and the recently adopted Guam Green Growth (G3) initiative and resulting goals, objectives, and action items. The G3 reflects a mandate from GovGuam and the community at large to plan for and achieve more sustainable development. The codification of conservation and high hazard risk reduction planning elements into the Guam Comprehensive Development Plan will be a major program change and step towards reaching shared sustainable growth goals.

III. Needs and Gaps Addressed

Identify what priority needs and gaps the strategy addresses, and explain why the proposed program change or implementation activities are the most appropriate means to address the priority needs and gaps. This discussion should reference the key findings of the assessment and explain how the strategy addresses those findings.

The strategy outlined here will assist GCMP in formalizing relevant development guideline, identifying enforcement authorities, and updating the Comprehensive Plan and enforceable policies as necessary to ensure the GCMP is effectively supporting its mission and mandates. The *2020 Assessment Report, Evaluation and Policy Recommendations for the GCMP (2020 Evaluation)*, identified opportunities to enhance the effectiveness of GCMP's planning and regulatory controls concerning development and natural resources protection. Key observations of the surveys and interviews conducted for this process included that:

- GCMP is an excellent planning and resource management partner and many agencies see opportunities for further collaboration;

- GCMP has limited influence over coastal resources management due to their current ability to only comment on permit proposals through the Guam Land Use Commission (GLUC) review process – many respondents indicated that expanded permitting and enforcement tools would result in more effective coastal resources management on Guam, but respondents also had various ideas of what this might look like in action; and
- Partner agencies and other stakeholders do not believe that GCMP has the ability to enforce coastal zone management polices at this time and are generally supportive of GCMP establishing regulations and supporting enforcement processes in order to ensure coastal management priorities are reflected in land management decisions.

In the 2020 Evaluation, numerous recommendations were compiled from identified interagency stakeholders that related to four general themes – capacity building, coordination, permitting, and enforcement. One cross-cutting recommendation that this 309 strategy would directly address is the suggestion that BSP should "consider supporting watershed-specific guidance development in comprehensive plan updates" as well as continue to "develop guidance in partnership with regulatory agencies (GEPA, DPW, DLM) who can enforce key provisions and communicate the need for these practices to developers and contractors". By codifying conservation districts which will serve as the basis for establishing boundaries delineating "special management areas" under the Comprehensive Development Plan through the territorial planning process to articulate and unify policies for smart coastal development in conservation areas, including but not limited to soil, water, forest, and high hazard risk management areas to protect people, property, and coastal resources. This strategy will help GCMP to address permitting and enforcement gaps and continue efforts to unify inter-agency guidance for development planning and projects on Guam.

IV. Benefits to Coastal Management

Discuss the anticipated effect of the strategy, including the scope and value of the strategy, in advancing improvements in the CMP and coastal management, in general.

The proposed Comprehensive Plan update and incorporation of revised special area management areas will enable GCMP and interagency regulatory partners to take a more unified and consistent approach to planning and project implementation. Upon completion these efforts will support comprehensive planning efforts that further shared goals to "maintain balance and equity between development and the environment in order to preserve the unique culture, traditions and beauty of the island", "optimize the use of resources to meet present and future", and "create conditions and opportunities whereby people fully participate and benefit at every level of social and economic activity" to "upgrade the quality of life for Guam's people".

V. Likelihood of Success

Discuss the likelihood of attaining the strategy goal and program change (if not part of the strategy goal) during the five-year assessment cycle or at a later date. Address the nature and degree of support for pursuing the strategy and the proposed program change, as well as the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

GCMP has been continuously working with network agencies to incorporate best available data into plan updates, development guidelines, and project permitting to ensure cumulative impacts of growth are considered and addressed. However, given the program's currently limited integration into "less than major" permitting decisions and segmented enforcement authority, an effective program change will need to achieve either codification of new authorities or expansion of existing development review requirements to ensure adopted planning elements and standards are uniformly applied. The COVID-19 pandemic has further strained Guam's limited resources and delayed ongoing planning efforts which will continue to present challenges to timely strategy implementation. Nevertheless, the work plan for this strategy has been developed considering these obstacles, and ongoing interagency support and GCMP's coordination efforts as evidenced by the high stakeholder meeting turnout despite the ongoing government shutdown as well as feedback from the Programmatic Assessment indicate these partnerships will provide the support GCMP needs to achieve this strategy component within the proposed performance period. To further ensure the success of these efforts, the workplan includes contingency measures where if the necessary support is not available from the Attorney General's Office, contractual support may be sought to obtain the guidance necessary to achieve the completion of necessary documentation to execute the Comprehensive Development Plan update that will be needed to incorporate plan revisions and draft proposed language to clarify enforcement mandates if necessary.

VI. Strategy Work Plan

Using the template below, provide a general work plan that includes the major steps that will lead toward or achieve a program change or implement a previously achieved program change. For example, even if the final adoption of the program change is outside of the CMP's control, what steps will be included in the work plan so the CMP ensures the program change is considered, reviewed, and hopefully adopted by the outside entity? Who are the other stakeholders or elected officials that need to be engaged, and how and when during the strategy development process? What is the decision-making or voting process that is involved in the adoption of the program change, and how will the CMP interact with this process to ensure that the proposed program change is considered? If the state intends to fund implementation activities for the proposed program change, describe those in the plan as well. The plan should identify a schedule for completing the strategy and include major projected milestones (key products, deliverables, activities, and decisions) and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual milestones are a useful guide to ensure the strategy remains on track, OCM recognizes that they may change somewhat over the course of the five-year strategy due to unforeseen circumstances. The same holds true for the annual budget estimates. Further detailing and adjustment of annual activities, milestones, and budgets will be determined through the annual cooperative agreement negotiation process.

Strategy Goal: Codify "conservation districts" which will serve as the basis for establishing boundaries delineating "special management areas" under the Comprehensive Development Plan through the territorial planning process to articulate and unify policies for smart coastal development in conservation areas, including but not limited to soil, water, forest, and high hazard risk management areas to protect people, property, and coastal resources.

Total Years: 5

Total Budget: $193,000

Year(s): 1-2

Description of activities: Work under the Bureau of Statistics and Plans' (Bureau's) central planning authority to update the draft Plan in conjunction with partner agencies in order to have the Plan submitted through the Guam Territorial Planning process for adoption by the Guam Legislature.

This project will be focused on finalizing the draft Guam Seashore Reserve plan and will be composed of three components.

Component 1: Compilation of existing Coastal and Marine Environment Baseline data

This project will create an inventory and maps of important biological and ecological areas and current human activities (and pressures) in the marine management area based on existing information collected from available sources in which GCMP will provide the network and contacts to the various data sources. The inventory will also address the variety of groups and sampling platforms pertinent to the characterization. The project team members will consist of the fellow, GCMP staff, and network partners and the project team will conduct the following tasks:

- Examine existing human uses and activities in regional waters, as well as active plans or planning efforts;
- Identify areas of multiple uses, as well as those of highest intrinsic user conflict;
- Identify human uses which may pose increasing pressure due to cumulative impacts;
- Develop narrative descriptions and visual representations that summarize these uses and short-term options to mitigate conflicts;
- Identify potential coastal and ocean use trends;
- Identify any existing valuations of regional ecosystem services; and
- Assess the findings to understand the current state of scientific knowledge for Guam's marine environment; identify areas that are not adequately characterized or not characterized at all;
- Identify scientific needs based on social and economic realities as well as gaps in scientific knowledge.

The first step in the process will be to organize and analyze the general categories of spatial information which include;

- Biological and ecological distributions including areas of known importance for a particular species or biological community;
- Spatial information about human activities;
- Oceanographic and other physical environmental features (bathymetry, currents, sediments) which in the absence of comprehensive biological data can be especially important for identifying different habitats and important processes, e.g., upwelling areas;
- Jurisdictional and administrative boundaries between local and federal waters (marine cadastre);

Deliverables will include a narrative on:

- Ecological characteristics of the marine area surrounding Guam for which data was collected.
- Particularly sensitive or ecologically important areas specific economic and social factors that need to be considered any sectors that depend on a certain type of marine area.

- Main pressures on the marine area, and are there any particular threats.
- Main driving forces likely to shape marine development in the near future.
- Description of present governance/stewardship landscape and its readiness to accelerate and expand coastal marine spatial planning (CMSP) dialog.
- Qualitatively describe information system assets and availability for use in open systems.

Component 2: Planning Area Alternatives

This component will work to define alternatives for the required elements in the Guam Seashore Reserve Plan. The baseline area will be determined through an alternative screening process that takes into account the connectivity between ecosystems, including the physical and biological needs necessary to sustain those ecosystems. The land, land/sea interface, and coastal zone will be considered within the area as each has a direct impact upon the other. In addition, the economic, social, and religious needs of the island inhabitants, as well as the needs of the local, state, and Federal government agencies that operate in the area would be taken into account. Alternatives will range in size and general area based on items such as legal local and federal zones to areas that encompass ecological zones. To determine each alternative, stakeholders with knowledge, experience, and judgments from various disciplines will be convened to determine the suite of alternatives, which will be presented in the Plan. For each alternative, suggested sustainability goals for that area will be outlined along with the various ecosystem (i.e., physical, biological) and human related (i.e., economic, social, military) aspects that must be maintained to meet them.

The following activities will be conducted under this component:

- Empanel an inter-disciplinary agency working group with oversight from the Guam Coastal Management Program.
- Hold working group meetings to establish a component work plan.
- Convert available data (discovered under Component 1) for use as planning area boundary layers using GIS. Such layers could include, but are not limited to, data on topography, geology, benthic and pelagic habitats and ecosystem boundaries, current land and ocean use information (e.g., conservation, agriculture, military danger zones, recreational and urban areas;, underwater cables, dredged material disposal areas, marinas), legal boundaries or marine cadastre (e.g., EEZ, State boundaries), in-coming and out-going vessel traffic patterns, areas set aside for special uses (e.g., marine sanctuaries, areas closed due to national security reasons), known fishing grounds, areas of known contamination or degradation, and public access locations.
- Develop a range of spatially-based and GIS-documented coastal and marine spatial planning area alternatives for the Guam pilot area.
- Present planning area alternatives to the working group and public comment and input on alternative specifics and preferences.
- Identify a preferred area for the Guam area in which the marine spatial plan will allow sustainable, safe, secure, efficient, and productive uses of the ocean while maintaining compatibility among uses and reducing user conflicts and environmental impacts.
- Document the process, data and techniques used to generate the alternatives. The documentation will highlight future ecosystem-based management approaches that address cumulative effects to ensure the protection, integrity, maintenance, resilience, and restoration of the ocean and coastal areas while promoting multiple sustainable uses.

Deliverables will include:

A report outlining the process used to develop Planning area alternatives along with a range of spatially-based and GIS-documented area alternatives with a preferred planning area specified, if consensus is reached.

Component 3: Drafting the Guam Seashore Reserve Plan

This project will be supported by the entire staff of the Guam coastal management program and its network partners, to include assistance from the Attorney General of Guam who will provide legal counsel and opinions as the plans and rules are drafted. The fellow will work with GCMP to go through the planning process and articulate the narrative to describe the plan as it relates to the following elements:

I. A land-use element.
II. A conservation for the preservation and management of the scenic and other natural resources of the seashore reserve.
III. A public access for maximum visual and physical use and enjoyment of the coastal reserve by the public.
IV. A recreation element.
V. A population element for the establishment of maximum desirable population densities.
VI. An educational or scientific use element.

Each of the elements will have a defined planning area that will be identified through the stakeholder engagement process, in which a vision description for each area will be articulated. The elements will include a defined list of management principals, in which the resources will be characterized. Uses of those resources will be identified as well as future alternatives. Using decision support tools, management measures will be established and an evaluation process will be formulated.

Outputs will consist of the following:

- Recommendations for the governmental policies and powers required to implement the plan to include the organization and authority of the governmental agency or agencies which will assume permanent responsibility for its implementation.
- Publish objectives, guidelines, and criteria for the collection of data, the conduct of studies, and the preparation of recommendations for the plan.
- Prepare its definitive conclusions and recommendations, including recommendations for areas that should be reserved for specific uses or within which specific uses should be prohibited.
- A final draft plan ready for submission to the Governor.

Major Milestone(s):

- Within three months of 309 approval, GCMP Administrator and Attorney General (AG) meet and execute a Memorandum of Understanding either reflecting scope of project support from AG or agreement from AG to review proposed planning elements developed by policy support team
- GCMP Administrator and Planners review revised plans for development of planning elements for incorporation into the Guam Comprehensive Development Plan within six months 309 approval and work either with assigned AAG or contracted policy support team to draft proposed planning elements for AG review

- While completing document review, GCMP Administrator and Planners review compile and prioritize list of guidance, publications, and plans for digitization, reprinting, and updates by end of Year 1
- Working either with AG or AG-sanctioned policy support team, GCMP drafts and presents proposed planning elements to the Guam Legislature and Governor for review and approval by end of Year 2

Budget: $40,000 (for AG or legal research / AG-sanctioned policy support team)

Year(s): 3-5

Description of activities: Update GCMP enforceable policies, guidance, and publications to reflect new SAM conservation planning elements.

Major Milestone(s):

- GCMP submits proposed revision(s) to enforceable policies by the end of Year 2
- GCMP publishes updated federal consistency guidance reflecting revised federal consistency policies by the end of Year 3
- Publication library including updated enforceable policies, planning elements, and digitized Kabales Na Planu Para Guahan, Guam Comprehensive Development Plan, included in BSP-GCMP website and crosslinked with Strategy #2 tool launch by end of Year 3
- GCMP holds at least one federal consistency training regarding updated section 307 guidance at annual Assembly of Planners meeting and others opportunistic or scheduled events
- By the end of Year 5, GCMP library includes current plans and relevant policies and guidance with a list of priorities for revision or updates to support 2025 309 update discussions

Budget: $153K spread out over years 3-5 years

As drafted, scope and budget focuses on federal consistency updates to reflect program change – section 306 and other funding may be leveraged to support guidance updates, digitization, website updates to include document library, and other supporting tools as prioritized by GCMP in Year 1.

VII. Fiscal and Technical Needs

A. Fiscal Needs: If 309 funding is not sufficient to carry out the proposed strategy, identify additional funding needs. Provide a brief description of what efforts the CMP has made, if any, to secure additional state funds from the legislature and/or from other sources to support this strategy.

As the strategy is drafted it is anticipated funding will be sufficient.

B. Technical Needs: If the state does not possess the technical knowledge, skills, or equipment to carry out all or part of the proposed strategy, identify these needs. Provide a brief description of what

efforts the CMP has made, if any, to obtain the trained personnel or equipment needed (for example, through agreements with other state agencies).

Although several existing staff members are very knowledgeable regarding background documentation that will need to be compiled and published to support components of this strategy including supporting the enforceable policy update process, GCMP is currently lacking the technical expertise required for the completion of this strategy in its entirety. However, the budget proposed will be sufficient to either support dedicated staff from the Office of the Attorney General or all for contracting of technical experts to facilitate the legal review needed to update the Guam Comprehensive Development Plan.

VIII. Projects of Special Merit (Optional)

If desired, briefly state what projects of special merit the CMP may wish to pursue to augment this strategy. (Any activities that are necessary to achieve the program change or that the state intends to support with baseline funding should be included in the strategy above.) The information in this section will not be used to evaluate or rank projects of special merit and is simply meant to give CMPs the option to provide additional information if they choose. Project descriptions should be kept very brief (e.g., undertake benthic mapping to provide additional data for ocean management planning). Do not provide detailed project descriptions that would be needed for the funding competition.

GCMP does not intend to apply for projects of special merit funding for this 309 strategy.

Strategy #2: Special Area Management Assessment Tools

I. Issue Area(s)

The proposed strategy or implementation activities will support the following high-priority enhancement areas *(check all that apply)*:

- ☐ Aquaculture
- ☐ Energy and Government Facility Siting
- ☒ Coastal Hazards
- ☐ Ocean/Great Lakes Resources
- ☒ Special Area Management Planning
- ☒ Cumulative and Secondary Impacts
- ☐ Wetlands
- ☐ Marine Debris
- ☐ Public Access

II. Strategy Description

A. *The proposed strategy will lead to, or implement, the following types of program changes (check all that apply):*

☐ A change to coastal zone boundaries;

☐ New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;

☐ New or revised local coastal programs and implementing ordinances;

☐ New or revised coastal land acquisition, management, and restoration programs;

☒ New or revised special area management plans (SAMP) or plans for areas of particular concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

☒ New or revised guidelines, procedures, and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government, and other agencies that will result in meaningful improvements in coastal resource management.

B. *Strategy Goal:*

State the goal of the strategy for the five-year assessment period. The goal should be the specific program change to be achieved or be a statement describing the results of the project, with the expectation that achieving the goal would eventually lead to a program change. For strategies that implement an existing program change, the goal should be a specific implementation milestone. For example, work with three communities to develop revised draft comprehensive plans that consider future sea level rise or, based on research and policy analysis, present proposed legislation on wetland buffers to state legislature for consideration. Rather than a lofty statement, the goal should be achievable within the time frame of the strategy.

The goal of the 2020-2025 Strategy 2: Special Area Management Implementation Tools is to further streamline project scoping and decision-making through the creation and use of a geospatial information

system visualization tool along with supporting trainings that will build capacity among GovGuam agencies and within the regulated community (developers and contractors) to support smart development and improved coastal resource management outcomes.

C. *Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change.*

(Note that implementation strategies are not to exceed two years.)

In the past Section 309 (2015-2020) cycle, GCMP executed a contract for a programmatic assessment which resulted in a report highlighting recommended action areas. A majority of GovGuam stakeholders agreed that BSP-GCMP should play a larger role in permitting, enforcement, and capacity building. Lack of unified data was consistently identified as a resource management challenge. To support the implementation of the codification of "Special Management Areas" in Strategy 1, this 309 project will combine existing geospatial data, identify and work to fill data gaps, and result in tool that will be used to support planning, permitting, and enforcement efforts within GovGuam as well as enable more informed development project scoping across the public and private sectors. This tool will include hyperlinks to the most current applicable regulations and policies to further unify resource management guidance, build capacity, and centralize critical geospatial data to ensure compliance with plans and enforceable policies of the GCMP.

These efforts will build off of prior 309-supported GIS management analysis tools that relate to Cumulative and Secondary Impacts (CSIs) on the northern part of the island's environment due to present and future activities. That tool includes a GIS-based land use query and assessment layers, but is not user friendly and lacks comprehensive datasets. By incorporating previously developed analysis tools with a unified "All Guam" layer, BSP can provide a tool that visualizes existing environmental conditions and projected future risk at island-wide and watershed-specific levels. Combining these and other relevant datasets with recently compiled critical infrastructure layers and sea level rise projections from the 2019 SLR and Social Vulnerability Assessment will create a "One Stop" planning and project scoping tool. This will address numerous identified information gaps and can serve as a platform to communicate development guidelines within a geospatially referenced format, helping decision-makers and developers see relevant regulations, environmental conditions, and other considerations that can promote improved planning and project implementation outcomes.

III. Needs and Gaps Addressed

Identify what priority needs and gaps the strategy addresses, and explain why the proposed program change or implementation activities are the most appropriate means to address the priority needs and gaps. This discussion should reference the key findings of the assessment and explain how the strategy addresses those findings.

A user-friendly visualization and communications tool will address multiple identified needs to ensure the success of this proposed program change. This tool and supporting trainings which will be provided both as workshops and as recorded or self-guided tutorials to ensure use continuity will help to expand

GCMP's ability to provide direct technical assistance as well as apply this tool to support pre-application project scoping meetings as suggested in OCM's 2017 Section 312 Evaluation Report.

IV. Benefits to Coastal Management

Discuss the anticipated effect of the strategy, including the scope and value of the strategy, in advancing improvements in the CMP and coastal management, in general.

This strategy will build off of prior impact assessment analysis work developed under the prior Section 309 strategy and is a logical next step in supporting accessible shared data sets. This geospatial information and supporting analysis capabilities will provide a shared understanding of the importance of adhering to development policy guidelines to meet shared growth objectives that can be more easily communicated to developers and the general public. It will also provide a framework to enable development of a standardized approach to permit recommendations within identified "special management areas" can be visualized in the GIS tool, putting developers and regulators "on the same page" regarding environmental constraints and requirements. In addition to benefiting the GCMP, the creation of this flexible tool can expand to support interagency review, permitting, and enforcement needs, building capacity and unifying guidance across GovGuam agencies.

V. Likelihood of Success

Discuss the likelihood of attaining the strategy goal and program change (if not part of the strategy goal) during the five-year assessment cycle or at a later date. Address the nature and degree of support for pursuing the strategy and the proposed program change, as well as the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

GCMP believes the likelihood of the successful execution of this strategy is high. In addition to broad inter-agency support, two significant federally supported mapping projects – CREST and FIRM updates – are anticipated to be occurring congruently with the efforts outlined in this strategy, which will streamline efforts to compile and share one set of quality controlled geospatial data that will be needed for tool development. This tool will support the visualization of plan updates discussed in Strategy 1 and provide a centralized development guidance resource that will unify interagency guidance, benefiting the public and private sectors. GCMP will further support the deployment of regular trainings, documentation, education and outreach, and incorporation of these resources into the 2025 Development Guide update to ensure ongoing use of these scoping resources that will result in beneficial outcomes for resource management as well as for development on Guam.

VI. Strategy Work Plan

Using the template below, provide a general work plan that includes the major steps that will lead toward or achieve a program change or implement a previously achieved program change. For example, even if the final adoption of the program change is outside of the CMP's control, what steps will be included in the work plan so the CMP ensures the program change is considered, reviewed, and hopefully adopted by the outside entity? Who are the other stakeholders or elected officials that need to be engaged, and how and when during the strategy development process? What is the decision-making or voting process that is involved in the adoption of the program change, and how will the CMP interact with this process to

ensure that the proposed program change is considered? If the state intends to fund implementation activities for the proposed program change, describe those in the plan as well. The plan should identify a schedule for completing the strategy and include major projected milestones (key products, deliverables, activities, and decisions) and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual milestones are a useful guide to ensure the strategy remains on track, OCM recognizes that they may change somewhat over the course of the five-year strategy due to unforeseen circumstances. The same holds true for the annual budget estimates. Further detailing and adjustment of annual activities, milestones, and budgets will be determined through the annual cooperative agreement negotiation process.

Strategy Goal: The goal of the 2020-2025 Strategy 2: Special Area Management Implementation Tools is to further streamline project scoping and decision-making through the creation and use of a geospatial information system visualization tool along with supporting trainings that will build capacity among GovGuam agencies and within the regulated community (developers and contractors) to support smart development and improved coastal resource management outcomes.

Total Years: 5

Total Budget: $187,000

Year(s): 1 - 2

Description of activities:

- Leverage existing Guam Mappers group to discuss scope, existing data, applications and connections to other GovGuam / UoG / etc projects
- Data compilation (including existing environmental and development data, hazard layers from Hazard Mitigation Plan, listed cultural areas, building footprints / critical infrastructure (may have internal / external facing layers if there are data sensitivity issues), QA/QC conducted in accordance with interagency data management SOP, gaps identified (ex – wetland boundaries) to support additional environmental and built environment data collection and refinement
- SMA mapping and project scoping tool development
- Long-term hosting agreement established to support tool development, launch, and ongoing use

Major Milestone(s):

- Environmental data compiled with list of QA/QC complete and data gaps by end of Year 1
- Develop and launch Beta Tool by end of Year 2

Budget: $187,000 for tool development and hosting over two years

Year(s): 3

Description of activities:

- Beta testing, stakeholder review, tool launch with supporting materials (and metadata!)
- Training and education / outreach materials development

Major Milestone(s):

- Full tool launch by end of Year 3

Budget: $37,000

Year(s): 4 - 5

Description of activities:

- Tool training (GovGuam and external) at annual Assembly of Planners meeting and others opportunistic or scheduled events
- Include all relevant regulations and existing policy / BMPs guidance for specific SMAs
    - Ex. for low lying / flood prone areas, see BMPs in Stormwater Management Guide, Silver Jackets guidance, Low impact development resources
        - Could be a PSM / online toolkit?
- Tool guidance -> policy guidance incorporated into Yr 5 update of the Guam Development Guide

Major Milestone(s):

- Annual tool trainings at Assembly of Planners in Year 4 and Year 5
- 2025 Guam Development Guide update to include new SAMs and updated section on federal consistency

Budget: $40,000

VII. Fiscal and Technical Needs

A. Fiscal Needs: If 309 funding is not sufficient to carry out the proposed strategy, identify additional funding needs. Provide a brief description of what efforts the CMP has made, if any, to secure additional state funds from the legislature and/or from other sources to support this strategy.

As the strategy is drafted it is anticipated funding will be sufficient.

B. Technical Needs: If the state does not possess the technical knowledge, skills, or equipment to carry out all or part of the proposed strategy, identify these needs. Provide a brief description of what efforts the CMP has made, if any, to obtain the trained personnel or equipment needed (for example, through agreements with other state agencies).

GCMP has developed this strategy proposal to contract out technically complex tool development components while creating training tools that build intra- and inter-agency capacity to use and mainstream the mapping and analysis programs when they are available.

VIII. Projects of Special Merit (Optional)

If desired, briefly state what projects of special merit the CMP may wish to pursue to augment this strategy. (Any activities that are necessary to achieve the program change or that the state intends to support with baseline funding should be included in the strategy above.) The information in this section will not be used to evaluate or rank projects of special merit and is simply meant to give CMPs the option to provide additional information if they choose. Project descriptions should be kept very brief (e.g., undertake benthic mapping to provide additional data for ocean management planning). Do not provide detailed project descriptions that would be needed for the funding competition.

Special projects to fill identified data gaps may include ground-truthing wetland boundaries, analysis of C-CAP data for fire frequency / extent to inform risk areas, and supporting tool implementation and policy development.

5-Year Budget Summary by Strategy

At the end of the strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy for each year. Generally, CMPs should only develop strategies for activities that the state intends to fund and work on given their anticipated level of Section 309 funding. However, in some circumstances, CMPs may wish to use the assessment and strategy development process as a broader strategic planning effort for the CMP. In that case, the CMP may elect to include additional strategies that exceed the state's anticipated Section 309 funding over the five-year period. If the CMP chooses this approach, it should still clearly indicate which strategies it anticipates supporting with Section 309 funding and which strategies it anticipates supporting through other funding sources.

Strategy Title	**Anticipated Funding Source (309 or Other)**	**Year 1 Funding**	**Year 2 Funding**	**Year 3 Funding**	**Year 4 Funding**	**Year 5 Funding**	**Total Funding**
Strategy 1 – SAM Codification	309	20,000	20,000	51,000	51,000	51,000	193,000
Strategy 2 – SAM Implementation	309, additional funding / partnerships to support	37,500	37,500	45,000	40,000	35,000	187,000
Total Funding		57,500	57,500	88,000	91,000	86,000	380,000

V. Summary of Stakeholder Engagement and Public Comment

This section provides a list of the stakeholder groups or individuals engaged during the assessment development process and a brief summary of their feedback. It also provides a summary of the public comments received during the public comment period and how the CMP responded to those comments.

Stakeholder Engagement

The Guam Coastal Management Program's (GCMP) efforts to develop this Section 309 Assessment and Strategy Report were delayed and complicated due to COVID-19 government shutdowns. A contract was executed to further support these efforts in June, 2020. Initial data requests and the "2020 Stakeholder Survey" were developed with GCMP in June, 2020, and a kick-off call was held with GCMP and the Guam Liaison on July 15, 2020. Supplemental data requests and the 2020 Stakeholder Survey were circulated by GCMP on July 16, 2020, and a Stakeholders Meeting was scheduled for August 28, 2020. The 2020 Stakeholders Survey included recommended questions in a user-friendly online survey format that included the nine enhancement priority areas, and a questionnaire asking stakeholders to rank and explain the problems and opportunities with their selected top three enhancement areas. The surveys also offered an area for additional commentary, and requested the stakeholders' contact and identifying information.

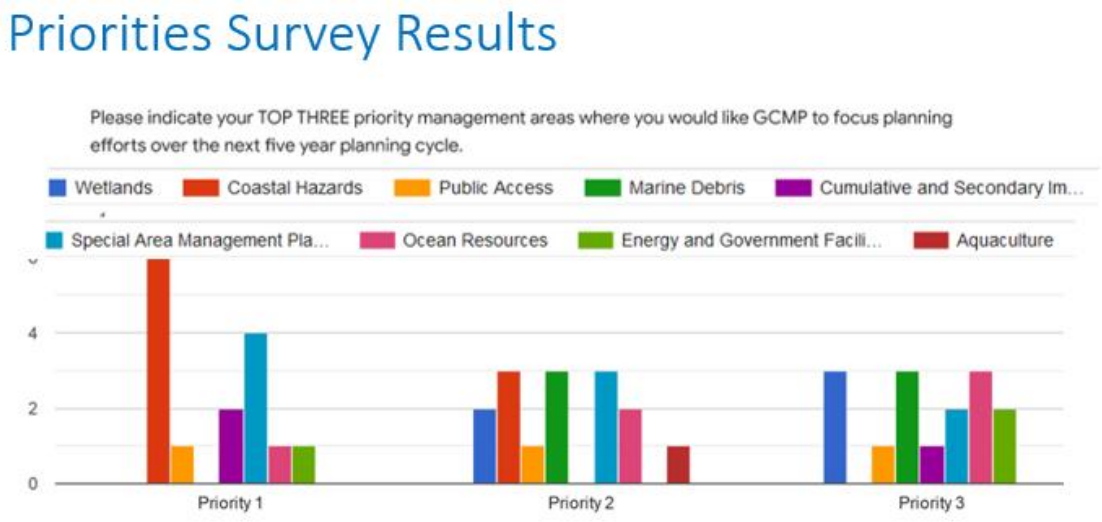
Unfortunately, due to Covid19, Guam has been in a state of general lockdown since March, 2020. Although "e-meetings" have been used to support engagement efforts, it has proven challenging to obtain follow-up information and feedback from stakeholder partners. GCMP sent several reminder requests to the identified stakeholder group, and the 2020 survey was closed on September 30, 2020, with 15 responses which are summarized further below. In total, sixteen stakeholders completed the survey questionnaire. Representatives from the following agencies and key stakeholder groups who completed the survey include:

- Bureau of Statistics and Planning – Guam Coastal Management Program
- Department of Agriculture
- Department of Public Works
- Guam Building Code Council
- Guam Environmental Protection Agency
- Guam Waterworks Authority
- University of Guam Center for Island Sustainability

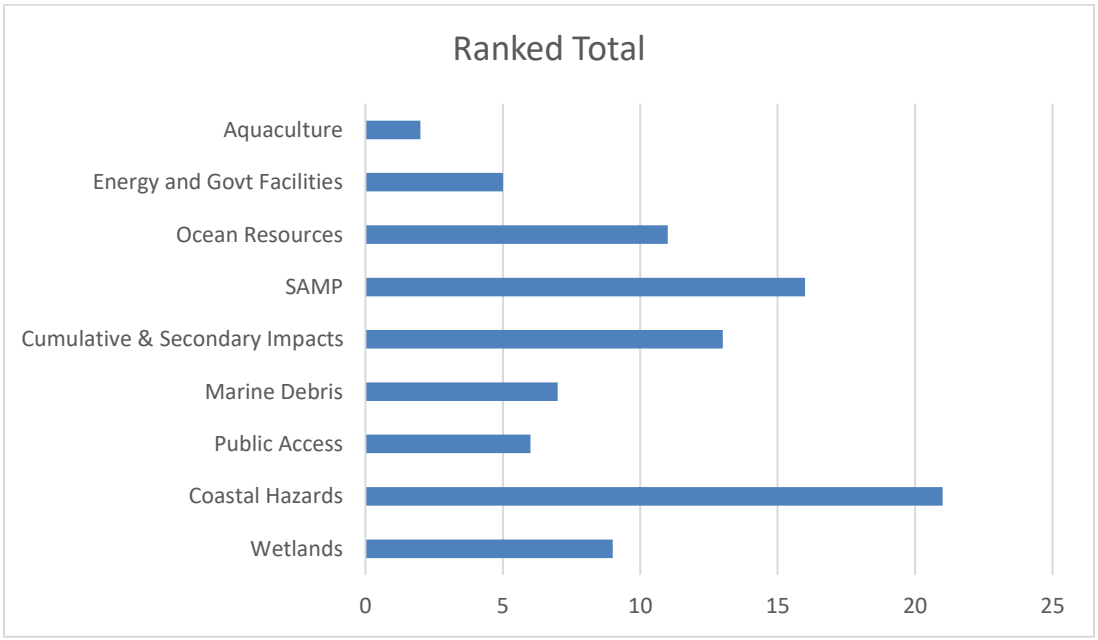
To supplement the surveys, GCMP planned a stakeholder engagement meeting which was delayed and rescheduled due to the ongoing GovGuam shutdown. On October 14, 2020, these initial results were presented at the rescheduled stakeholders meeting, which included thirty attendees from GCMP, stakeholder agencies, and representative from the University of Guam. The presentation and meeting notes are included in Appendix I here. As reflected in the notes document, numerous updates were provided by the engaged stakeholders. Follow-up interviews with GCMP were conducted to further refine the contents of this 309 Report. A check-in call with NOAA-OCM was held on October 16, 2020, and prioritizations and proposed 309 strategies were discussed to support priority rankings further. Public comments on this draft will be included in Appendix II and summarized further in the final document.

Priority Rankings

Each respondent was asked to select their top three priority enhancement areas and rank them with a "1" (for highest) through "3" (for lowest). A total of five stakeholders listed "Coastal Hazards" as their top priority, with three listing it as their second highest priority, while four listed SAMPs and two listed CSI as their leading priority for management efforts over the next five-year planning cycle.



Total priority rankings were calculated by weighting priorities with high "1" responses receiving 3 points, priority "2" receiving 2 points, and priority "3" receiving one points. Using this method, the total count for each enhancement area is depicted in the graph below:



This weighted ranking system further emphasized the heavy prioritization that stakeholders placed on Coastal Hazards, SAMPs, and CSI, with score of 21, 16, and 13. Stakeholders also placed emphasis on

Ocean Resources (11), and Wetlands (9), with less emphasis placed on Public Access (7), Marine Debris (6), Energy and Government Facility Siting (5), and Aquaculture (2). Although only receiving one vote as priority enhancement area, as discussed further in the body of this Assessment Report, stakeholders agreed "Aquaculture" was nonetheless a medium priority enhancement area due to the Administration's focus on developing this sector.

Comments on Challenges and Opportunities

Along with ranking the top three of nine enhancement areas that stakeholders highlighted as management priorities, respondents were also asked to provide insight on the challenges and opportunities that GCMP might encounter in managing these selected enhancement areas. Some of the responses relevant to the three selected "high priority" enhancement areas are provided below for reference. Grammar and spelling were not changed. The full set of survey responses and meeting materials are included in Appendix I of this report for further reference. The responses highlighted here are intended to provide context for recurrent comments and themes that were detailed in this report.

As reflected by the comments outlined below, numerous survey respondents identified flooding and water quality as leading concerns. In the comments discussing challenges and opportunities it became clear that shared concerns were being associated with seemingly overlapping priority areas – so, for example, "flooding" was discussed by survey respondents in terms of coastal hazards, CSI, and SAMP. In the Stakeholder Workshop and subsequent interviews, participants generally agreed that increasing rankings of these three identified areas would address cross-cutting resource management issues that were identified in survey responses and detailed further in the draft report.

<u>Priority Challenges</u>

Question: What do you feel are the greatest problems regarding your "Priority 1" enhancement area?

- *Coastal Hazards*: Understanding of Coastal Hazards and Whom to report concerns or issues
- *Coastal Hazards, Cumulative and Secondary Impacts*: Human activities that create impact to the environment resulted to flooding, water quality impairment and destroy habitat
- *Coastal Hazards, Cumulative and Secondary Impacts*: Water quality and beach erosion caused by cumulative impacts from private development that did not follow design or maintenance standards, and inadequate public infrastructure for drainage. Secondly, erosion and sedimentation from massive unregulated activities, in particular off-roading
- *Coastal Hazards, Cumulative and Secondary Impacts, SAMPs*: Flooding events are fouling water quality and creating dangerous road conditions. With changing climate conditions these impacts are likely to become more pronounced, and may lead to increasingly dangerous conditions in flood-prone areas in the south side and low-lying tourist-focused areas
- *Cumulative and Secondary Impacts:* Our coastal vegetation is vulnerable and fragile, and need to be protected from development. Where areas are developed native vegetation needs to be promoted and LID. Further efforts to reduce erosion upland of the coastal area.

- *SAMPs*: Special Area Management Plans need to be completed and adopted as part of the Guam Comprehensive Development Plan. This will set the construct for geographic delineation and structure for managing these areas.
- *SAMPs*: ORGANIZING RESOURCE AGENCIES AND WATERSHED COMMUNITY RESIDENTS TO HELP DEVELOP AND SUPPORT THE IMPLEMENTATION OF WATERSHED PLANS.

Priority Opportunities

Question: What are the greatest opportunities GCMP has for enhancing your "Priority 1" management area?

- *Coastal Hazards / CSI / SAMPs:* Because there are so many risks and impacts it would seem like there would be opportunities to align management efforts to support co-benefits to conservation areas and support watershed management, especially in risk-prone areas with highly vulnerable populations.
- *SAMPs / Cumulative and Secondary Impacts:* Develop plans for increased specificity in protecting our significant natural resources.
- *SAMPs:* Territorial Planning authorities are already in place
- *SAMPs:* The creation of the Seashore Reserve Management plan

Comments on the Draft 309 Assessment and Strategy Report

This section will be updated to include a list of commenters and analysis of general themes that emerged from comments received at the close of the comment period for inclusion in the final report.

VI. Key References

In text citations are included in relevant subsections. This "Key References" section provides full citations for major documents that are cited in multiple sections throughout the 309 Assessment and Strategy Report.

Guam Bureau of Statistics and Plans, *Guam Statistical Yearbook,* 2018, (2018 Statistical Yearbook, BSP), available at https://sdd.spc.int/digital_library/2018-guam-statistical-yearbook

Guam Environmental Protection Agency, *Section 303(d) and 305(b) Water Quality Assessment and Integrated Report,* 2018 (2018 IR, GEPA)

Guam Homeland Security / Office of Civil Defense, 2019 Guam Hazard Mitigation Plan, July 2019 (GHMP, 2019), available at https://ghs.guam.gov/sites/default/files/final_2019_guam_hmp_20190726.pdf.

King, R., M. Higgs, E. Leon-Guerrero, *Vulnerability Assessment of Built Infrastructure near Coastal Bays using three Sea Level Rise Scenarios – Guam,* Dec. 2019, available at http://bsp.guam.gov/guamccva/

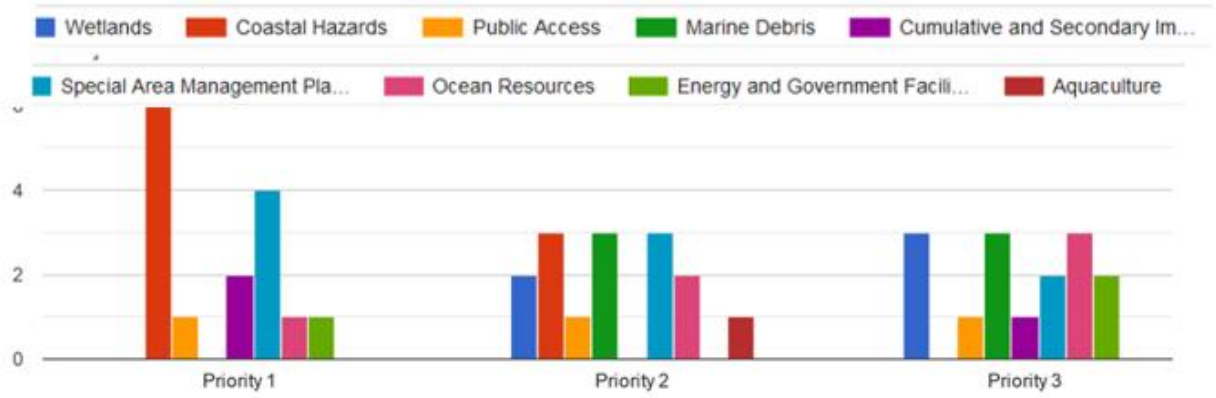
National Oceanic and Atmospheric Administration, Office for Coastal Management. "Guam 2016 C-CAP." Coastal Change Analysis Program (C-CAP) Regional Land Cover. Charleston, SC: NOAA Office for Coastal Management, available at https://coast.noaa.gov/digitalcoast/data/ccapregional.html

Appendix I – Survey Results and Stakeholder Meeting Documents

Survey responses including specific prioritization comments and the resulting Stakeholder Meeting documentation are included for reference here.

Question: Please indicate your TOP THREE priority management areas where you would like GCMP to focus planning efforts over the next five-year planning cycle.

Summary of 16 Responses:



Question: What do you feel are the greatest problems regarding your "Priority 1" enhancement area?

Stakeholder Responses (16 Responses, reported as submitted):

- Flooding and Erosion
- Human activities that create impact to the environment resulted to flooding, water quality impairment and destroy habitat
- Special Area Management Plans need to be completed and adopted as part of the Guam Comprehensive Development Plan. This will set the construct for geographic delineation and structure for managing these areas.
- Water quality and beach erosion caused by cumulative impacts from private development that did not follow design or maintenance standards, and inadequate public infrastructure for drainage. Secondly, erosion and sedimentation from massive unregulated activities, in particular off-roading.
- Understanding of Coastal Hazards and Whom to report concerns or issues
- Shoreline erosion
- Protecting public access to beach access sites under existing statute.
- ORGANIZING RESOURCE AGENCIES AND WATERSHED COMMUNITY RESIDENTS TO HELP DEVELOP AND SUPPORT THE IMPLEMENTATION OF WATERSHED PLANS.
- There isn't a priority for alternative energy that is sustainable for Guam. GPA will be building another diesel fuel/combine cycle and does not have a real solution for using more solar or wind or another sustainable power source. Over the years, GCMP does not have any interest in tackling

this critical issue. If we do not look toward more sustainable power sources, the impacts of climate change will be felt faster than Guam anticipates.

- Beach/ Ocean cleaning of debris by public impacting marine biology and impacting ocean food resources.
- Our coastal vegetation is vulnerable and fragile, and need to be protected from development. Where areas are developed native vegetation needs to be promoted and LID. Further efforts to reduce erosion upland of the coastal area.
- Erosion, flooding, hardened shoreline structures, development
- Flooding and soil erosion
- Awareness of Policies in place to protect coastal resources
- Flooding events are fouling water quality and creating dangerous road conditions. With changing climate conditions these impacts are likely to become more pronounced, and may lead to increasingly dangerous conditions in flood-prone areas in the south side and low-lying tourist-focused areas.
- Overfishing, food security, sustainable harvest

Question: What are the greatest opportunities GCMP has for enhancing your "Priority 1" management area?

Stakeholder Responses (14 Responses, reported as submitted):

- Leveraging resources to find solutions
- Public outreach, support to policy making and development of strategy planning
- Territorial Planning authorities are already in place.
- Control damage from off-roading through the following: public outreach, closure of priority trails and areas, revegetation projects, and program to implement best management practices through volunteer off-roader groups and community. for stormwater, continue to facilitate government-wide efforts to address.
- Collaboration with USACE
- Completed and implement the Public Access plan that GCMP was working on.
- TECHNICAL ASSISTANCE FUNDING
- Developing laws, regulations, and vision in reducing use of fossil fuel. Incorporating Climate Change and other air quality regulations in the enforceable policies.
- Coastal inundation loss of beaches
- Provide workshops on LID and native planting. Outreach projects and pilot programs. Work on Masterplan.
- The creation of the Seashore Reserve Management plan
- Develop plans for increased specificity in protecting our significant natural resources.

- Their ability to network and leverage resourses
- Because there are so many risks and impacts it would seem like there would be opportunities to align management efforts to support co-benefits to conservation areas and support watershed management, especially in risk-prone areas with highly vulnerable populations.

Question: What do you feel are the greatest problems regarding your "Priority 2" enhancement area?

Stakeholder Responses (16 Responses, reported as submitted):

- Human activity
- decreasing footprints due to development and impact to habitat
- Flooding and shoreline and riverbank erosion
- Lack of enforcement (or leadership?) over land uses: e.g. coastal development, quarries, etc.
- Understanding what the Ocean Resources are and where
- The general public's lack of understanding about Guam's water resources - Ugum River and Northern Guam Lens Aquifer
- Flooding, shore erosion.
- SHORTAGE OF AVAILABLE LOCAL WETLAND EXPERTISE --- I.E. SOIL SCIENTISTS, BOTANISTS, LABORATORY ANALYTICAL SERVICES
- After this experience with COVID, looking for methods to increase sustainable food sources needs to be more of a priority.
- Better control of industrial discharge into rivers and streams causing increase in toxins such as mercury, lead, PCB in ocean
- It is often unclear where and how the public can be engaged when accessing conservation areas, trails, and coastal areas.
- Lack of proper recycling facilities, inadequate access to recycling and trash bins in public areas,
- Getting stakeholders active an involved in its mission and funding issues.
- Policy awareness
- There are local and global issues with marine debris, but locally, we still don't have enough enforcement of existing litter laws.
- Flooding, loss of habitat, habitat restoraition

Question: What are the greatest opportunities GCMP has for enhancing your "Priority 2" management area?

Stakeholder Responses (15 Responses, reported as submitted):

- Education Outreach
- Provide support on policy making

- Leveraging USACE Technical and engineering capabilities to study high hazard areas and produce mitigation options. GCMP can then move into project planning once we have the data and technical document to begin finance and CIP planning.
- Find a way to enforce the coastal plan. For example, construction near shoreline. GEPA received criticism for permitting recent clearing and backfilling along shoreline near Adelup, but our regulations only provide for BMPs, not uses. If the use is not compatible, this is something that should be regulated separately. GEPA's statutes do not generally regulate uses, only pollutants. Quarries are another similar situation. They cause considerable concern among the community and particularly neighbors, but GEPA regulations are blind to purpose and provide only for the implementation of BMPs. Some other program would need to regulate the use. This is probably covered by zoning, but DLM/zoning has taken no action. This is something again where GCMP could step in and facilitate Gov Guam being a better steward of our resources.
- Have a better understanding of how to protect our critical resources and where to get assistance
- Educational outreach - workshops with engineers, developers, architects and public agency officials
- Implement a flooding and shore erosion plan.
- SUPPORT THE UPDATE OF GUAM'S 2001 WETLAND CONSERVATION PLAN
- Provide funding to aquaculture pilot test that UOG CIS.
- Assist DPW in their newly given responsibility to discharge storm drainage from roadways into the ocean.
- Outreach and improved information to the public.
- Continual beach clean-ups, outreach to educate the public on marine debris
- Outreach and education to elected leaders/government officials to enact change.
- Staff knowledge
- Expanded enforcement and improved beach access and public facilities with regular trash pick-up would help to address locally based pollution. Asking hotels to help educate tourists and reduce plastic packaging at the source could also help reduce litter and support solid waste reduction efforts.

Question: What do you feel are the greatest problems regarding your "Priority 3" enhancement area?

Stakeholder Responses (14 Responses, reported as submitted):

- Ocean pollution and impact to habitat
- The Territorial Seashore Reserve Plan is not complete.
- Lack of safe / maintained access to shore especially in very popular areas like Tumon. Beach access alongside Hyatt is a prime example. It is poorly maintained, standing water, and dark.
- Poor planning moves events to special planning in a short amount of time
- Location of wetlands on Guam

- FUNDING/SCHEDULING DIVERS AND HAZARDOUS WASTE EXPERTISE FOR SAFE REMOVAL OF ADV
- GCMP does not understand how to fully utilize CSI to determine affect to resources in the coastal zone. GCMP does not use CSI to evaluate private and government sponsored projects. CSI needs to be evaluated for projects above the aquifer.
- This item is related to management of land being lost to the ocean; needs great attention; sea level rise due to climate change must come under control
- Promote and implement alternative energy.
- Unable to answer this question
- Education and changing public perception/culture of beach and shore littering. Enacting more strict litter laws and more enforcement, fines etc.
- Government not capitalizing on funding opportunities for new facilities
- There are lots of expanding and sometimes conflicting use pressures on ocean resources. We have seen a major increase in shipping which may at times conflict with tourist uses. Also the Navy's Marianas Islands Training and Testing program was recently expanded and includes increased testing in the oceans around Guam. This is really concerning because of the whale strandings that have been shown to be correlated with active sonar use that is involved with some of these activities. We are also learning about how our waters are whale and manta breeding and migrating grounds and the MITT activities seem to be in conflict with efforts to study, conserve, and benefit from the presence of these animals in our waters.
- boating access on east coast and sunken boats

Question: What are the greatest opportunities GCMP has for enhancing your "Priority 3" management area?

Stakeholder Responses (13 Responses, reported as submitted):

- Public outreach and support to policy making
- Territorial Planning authorities are already in place and award of a Coastal Fellow 2020-2022
- Enforce shoreline access rules and require businesses to maintain and improve access routes.
- Sharing of resources, planning right in accordance with time management thereby leaving room for improvement
- Partnerships with Dept. of Agriculture and Guam EPA on programs to improve and protect wetland habitat
- New policies and developing laws that are meant to protect, restore and enhance wetland areas and reduce development in the surrounding areas.
- CONTINUED PARTNERSHIP WITH GUAM EPA FOR ITS ADV PROGRAM (ABANDONED DERELICT VESSELS)

- Fund CSI tools. Obtain data that will support the CSI tool.
- Reduce carbon emission. The newly proposed Guam Power Authority using fossil fuel that is not in compliance with creating green/ clean energy should be revisited.
- Outreach and implementation.
- Outreach and education to elected leaders/government officials to enact change.
- Success at receiving grant awards
- There needs to be improved focus on ocean resources for multiple co-benefits. Just investing in our ocean tourism activities isn't enough - we need to work together to make sure these systems are managed to enhance the biological systems that support our human uses. Especially with the tourism reductions due to Covid, it would seem like this is a great time to study these systems more and come up with some long-term management plans that protect fragile reef systems and known breeding areas for endangered species and other species of concern.

Question: Are there management CHALLENGES regarding other enhancement areas you would like to comment on? If so, please specify the enhancement area and provide your additional comments here.

Stakeholder Responses (7 Responses, reported as submitted):

- Public access to shoreline sites are not enforced
- No
- ACCESSING WATERSHED RESTORATION PROJECT INFORMATION --- WATERSHED LOCATIONS, OBJECTIVE AND PROJECT RESULTS/IMPACTS
- Training is required for understanding CIS and how to incorporate in Federal Consistency and Application Review.
- Small communities such as Guam can produce clean energy, wind, solar, and OTEC must be considered fully.
- Our ocean resources are very delicate. More guidance is needed on sustainable fishing practices. Consumers need to educated on sustainable food seafood choices, and will guide the market that way.
- The military build-up is already having significant impacts on the ecology, cultural resources, and economy of Guam. Plans to offset these impacts have focused mainly on infrastructure and the cultural repository, and it does not seem like environmental impacts have been well assessed or addressed. This is especially problematic as we work to invest in reef resilience and groundwater protection while major infrastructure projects move forward that don't seem to complement those efforts, and was we lose access to public beaches due to base restrictions, which focuses impacts on existing heavily used park facilities. If the DoD is going to be a good partner for sustainable growth on Guam, these considerations should be incorporated into and addressed in build-up planning.

Question: Are there management OPPORTUNITIES regarding other enhancement areas you would like to comment on? If so, please specify the enhancement area and provide your additional comments here.

Stakeholder Responses (5 Responses, reported as submitted):

- Cumulative & Secondary Impacts - stormwater management manuals vary and developers pick and choose which manual that best suits their project. 1) CNMI Guam Stormwater Management Manual; 2) Guam Transportation Stormwater Drainage Manual
- No
- GCMP receives a large amount of federal funds, more partnership should be developed with more qualified partners.
- Climate change is one of the cumulative effects. A holistic approach to responsible development and protection of areas can protect our island.
- There are lots of opportunities for partnerships but it will take clear guidance and dedicated support staff to really achieve results.

Question: What would a successful 5-year outcome for your Priority 1 enhancement area look like to you?

Stakeholder Responses (12 Responses, reported as submitted):

- Decrease impact by 50%
- Planning is optimized and contributing to finding solutions through the proper management of SAMPS
- Updated statutes and regulations delineated agency responsibilities for stormwater, for new development, retroactive standards for old development, and requirements for public infrastructure. A heightened awareness of public drainage and stormwater quality infrastructure leading to funding. Stronger enforcement of rules including increased staffing for GEPA and the ability for GCMP to assist in enforcement of stormwater rules.
- a living document that documents all coastal hazards and identifying responsible stakeholders.
- Resilient shorelines or resilient coastal communities
- Consistent successful enforcement for Public Access to remote coastal areas.
- ORGANIZED WATERSHED ENTITIES (COMMUNITY BASED/OR ENVIRONMENTAL INTEREST GROUP) LEADING SPECIFIC WATERSHED RESTORATION PROJECTS INCLUDING PUBLIC AWARENESS
- GPA power plant reduced footprint. Increase support for solar and wind. Use Government land to increase solar footprint.
- Ocean free of debris and toxins; increase in fish population.
- Sustainable development goals for coastal areas, and protect a certain percentage of the coastal areas protected (via master-plan).

- Flooding and hazard management plans are in place that include consideration of and investment in nature-based solutions for priority watersheds and high risk areas.
- Return of large reef fish, increase commercial opportunities for pelagic fish harvest

Question: Please share any additional comments here.

Stakeholder Responses (1 Response, reported as submitted):

- GCMP has an opportunity to "fill in the gaps". They need to find something they are good at and fill that need with appropriate staff.

Question: Please describe your selection of "other" priorities here.

Stakeholder Responses (2 Responses, reported as submitted):

- Wetland not understanding its importance and the government not exchanging with another property so land owner can build upon property and Marine Debris-reduces quantity of food for islanders.
- Maybe these planning updates could be included in a larger Guam Comprehensive Plan update for natural resources and the built environment?

These survey results were used to support prioritization and strategy development with GCMP.
The following pages include the slides and meeting notes from the Stakeholder Workshop, held virtually on October 12, 2020. Red text in the slides was used to flag items for further discussion during the "Question and Answer" session. This feedback has been incorporated into this revised Draft 309 Assessment and Strategy Report.


BUREAU OF STATISTICS AND PLANS
2020 Assessment Strategy and Report
GCMP 309 Planning Review - Virtual Meeting
Monday, October 12, 2020

OVERVIEW

- Welcome Remarks

Edwin Reyes, GCMP Administrator

  - About BSP-GCMP
  - Why we are here

- House Keeping
- 309 Update Process
  - Initial Survey Results
  - Prioritization exercise
- Enhancement Areas Review
- Next Steps

GCMP Section 309 Assessments & Strategies Update Stakeholder Meeting

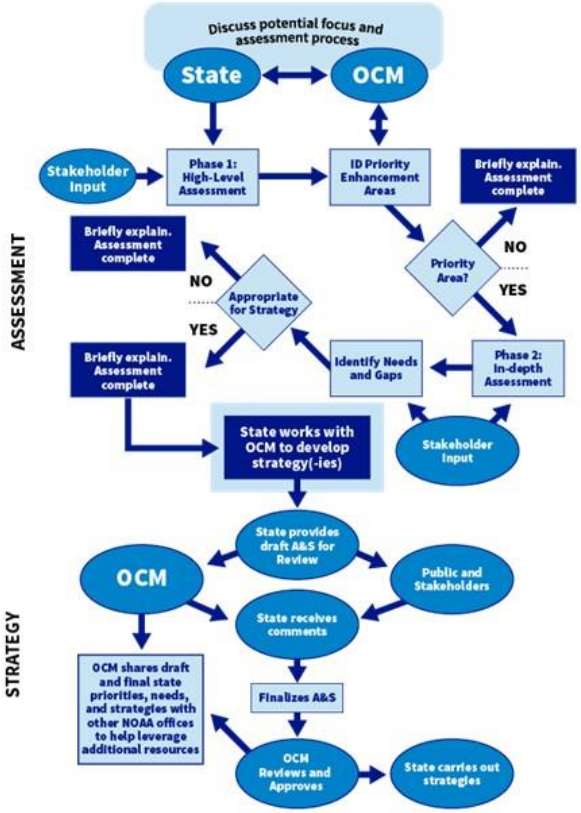
Monday, October 12 2020 - Virtual Conference via Google Meet
https://meet.google.com/kxi-txcs-fgg
(US) +1 715-600-0161 PIN: 172 585 200#

9:00am – 9:05am	Welcome remarks by GCMP
9:05am – 9:10am	Google Meet Housekeeping
9:10am – 9:20am	309 Update Process (survey results and prioritization)
9:20am – 9:30am	Enhancement Area 1 – Wetlands
9:30am – 9:40am	Enhancement Area 2 – Coastal Hazards
9:40am – 9:50am	Enhancement Area 3–Public Access
9:50am – 10:00am	Enhancement Area 4 – Marine Debris
10:00am – 10:10am	Enhancement Area 5 – Cumulative & Secondary Impacts
10:10am – 10:20am	Enhancement Area 6– Special Area Management Planning
10:20am – 10:30am	Enhancement Area 7–Ocean Resources
10:30am – 10:40am	Enhancement Area 8–Energy & Government Facility Siting
10:40am – 10:50am	Enhancement Area 9 –Aquaculture
10:50am – 11:00am	Q & A (Review questions from Google Meet chat)
11:00 am – 11:15 am	Discussion and Recommendations
11:15 am – 11:30am	Next steps and Adjournment

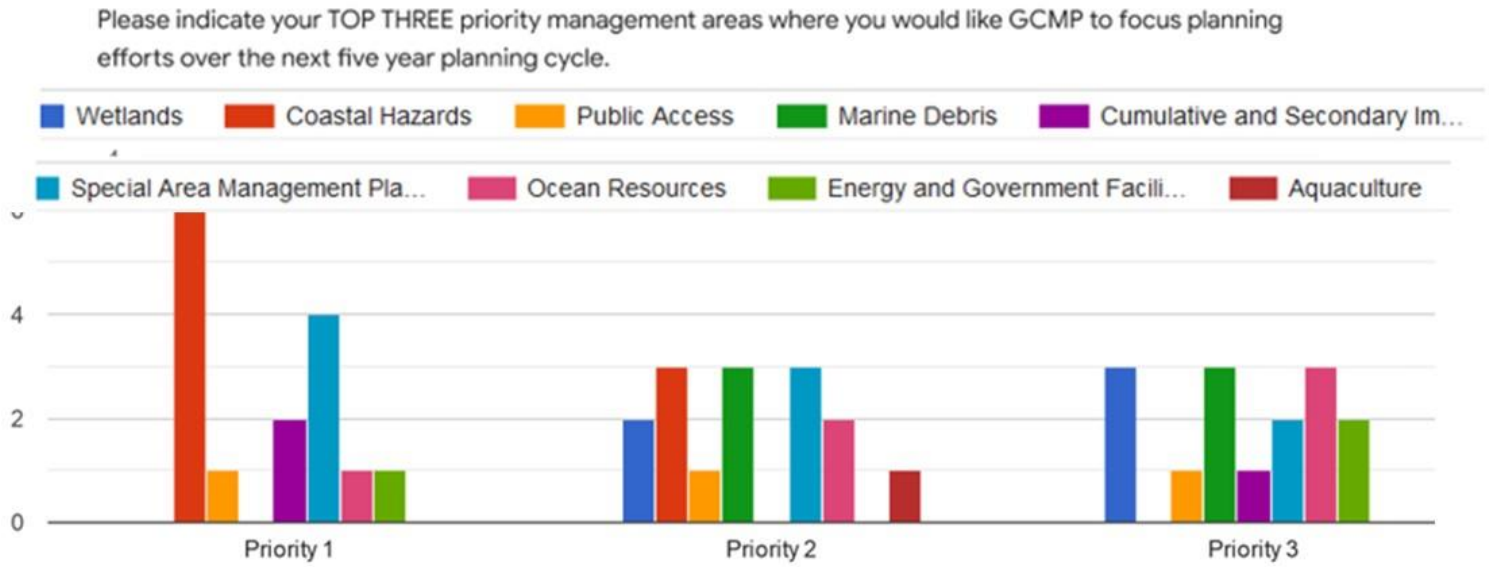
309 Update Process

- Assess changes since last report
- Identify priorities for "program change"
- Develop "Phase II" assessment for selected priorities
- Create a strategy to support implementation of selected approach for the next 5-year planning cycle

309 Planning

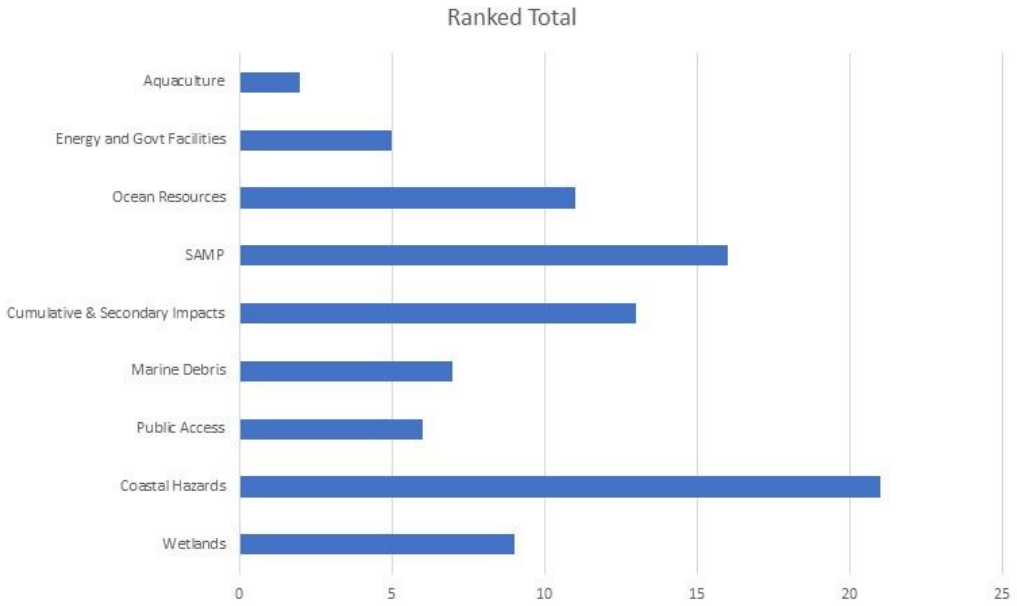


Priorities Survey Results



Initial Survey Results

#1 - Coastal Hazards
#2 – Special Area Management Planning (SAMP)
#3 – Cumulative & Secondary Impacts (CSI)



Initial Survey Results

What do you feel are the greatest problems regarding your "Priority 1" enhancement area?

Flooding and Erosion
Human activities that create impact to the environment resulted to flooding, water quality impairment and destroy habitat
Special Area Management Plans need to be completed and adopted as part of the Guam Comprehensive Development Plan. This will set the construct for geographic delineation and structure for managing these areas.
Water quality and beach erosion caused by cumulative impacts from private development that did not follow design or maintenance standards, and inadequate public infrastructure for drainage. Secondly, erosion and sedimentation from massive unregulated activities, in particular off-roading.
Understanding of Coastal Hazards and Whom to report concerns or issues
Shoreline erosion
Protecting public access to beach access sites under existing statute.

Initial Survey Results

What do you feel are the greatest problems regarding your "Priority 1" enhancement area?

ORGANIZING RESOURCE AGENCIES AND WATERSHED COMMUNITY RESIDENTS TO HELP DEVELOP AND SUPPORT THE IMPLEMENTATION OF WATERSHED PLANS.

There isn't a priority for alternative energy that is sustainable for Guam. GPA will be building another diesel fuel/combine cycle and does not have a real solution for using more solar or wind or another sustainable power source. Over the years, GCMP does not have any interest in tackling this critical issue. If we do not look toward more sustainable power sources, the impacts of climate change will be felt faster than Guam anticipates.

Beach/ Ocean cleaning of debris by public impacting marine biology and impacting ocean food resources.

Our coastal vegetation is vulnerable and fragile, and need to be protected from development. Where areas are developed native vegetation needs to be promoted and LID. Further efforts to reduce erosion upland of the coastal area.

Enhancement Area Updates

- Identify updates from last assessment
- Prioritize 309 recommendations
- Support next steps to addressing priority needs for comprehensive coastal resource management

Enhancement Area Updates - Wetlands

Section 309 Enhancement Objective: Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands. §309(a)(1)

- Identify change – C-CAP 2005 - 2011
  - *2016 C-CAP Data obtained and processed – data anomaly / processing*
  - UoG WERI Watershed Boundaries and % Impervious Cover Change discussed as "SAMP"

Coastal Wetlands Status and Trends		
Current state of wetlands in 2011 (acres)		
Percent net change in total wetlands (% gained or lost)*	from 1996-2011	from 2006-2011
	Information not available	0.56% increase
Percent net change in freshwater (palustrine wetlands) (% gained or lost)*	from 1996-2011	from 2006-2011
	Information not available	0.32% increase
Percent net change in saltwater (estuarine) wetlands (% gained or lost)*	from 1996-2011	from 2006-2011
	information not available	1.49% increase

Management Category	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N
Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition)	N

GEPA 303(d) & 305(b) Data – 2018 IR

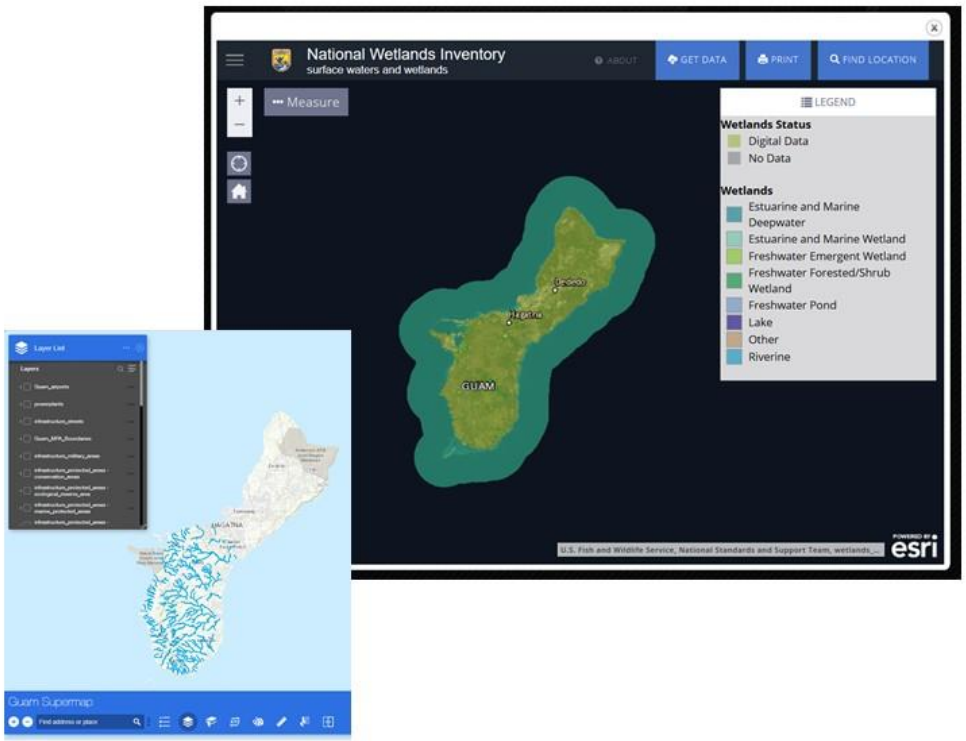


TABLE 23. 2018 GUAM WETLANDS ASSESSMENT DATA

Waterbody Name	Assessment Unit ID	WATERSHED Location	STATE	Water Type & Classification	Water Size (Acres)	Acres Assessed	Water Status	Reporting Category
Agana Swamp	GUG-1B	HAGATNA	GU	Wetlands - S2	175.44	6.40	IMPAIRED	5
Barrigada Ponding Basin	GUW-001	NORTHERN	GU	Wetlands - S2	0.74	0.00	Not Assessed	3
Masso Reservoir	GUW-002	PITI/ASAN	GU	Wetlands - S3	4.94	0.00	Not Assessed	3
Sasa Bay Wetlands	GUW-003	APRA	GU	Wetlands - S3	252.05	0.00	Not Assessed	3
Atantano Wetlands	GUW-004	APRA	GU	Wetlands - S3	321.24	0.00	Not Assessed	3
Shell Oil Wetlands	GUW-005	APRA	GU	Wetlands - S3	5.68	0.00	Not Assessed	3
Naval Station Marsh	GUW-006	APRA	GU	Wetlands - S3	98.84	0.00	Not Assessed	3
San Luis Ponds	GUW-007	APRA	GU	Wetlands - S3	18.53	0.00	Not Assessed	3
Namo River Marsh	GUW-008	AGAT	GU	Wetlands - S3	81.54	0.00	Not Assessed	3
Pulantat Marshes	GUW-009	YLIG	GU	Wetlands - S3	4.94	0.00	Not Assessed	3
Naval Magazine Pond	GUW-010	YLIG	GU	Wetlands - S3	1.24	0.00	Not Assessed	3
Fena Valley Reservoir	GUW-011	TALOFOFO	GU	Wetlands - S1	200.18	0.00	Not Assessed	3
Naval Magazine Marshes	GUW-012	TALOFOFO	GU	Wetlands -S1	5.93	0.00	Not Assessed	3
Talofofo River Valley	GUW-013	TALOFOFO	GU	Wetlands - S1	689.42	0.00	Not Assessed	3
Saressa Marsh	GUW-014	TALOFOFO	GU	Wetlands - S1	6.18	0.00	Not Assessed	3
Assupian Marsh	GUW-015	INARAJAN	GU	Wetlands - S3	1.24	0.00	Not Assessed	3
Yabai Wetland	GUW-016	INARAJAN	GU	Wetlands - S3	2.47	0.00	Not Assessed	3
Aglayan River Valley	GUW-017	INARAJAN	GU	Wetlands - S3	69.19	0.00	Not Assessed	3
Achang Bay Mangroves	GUW-018	GEUS	GU	Wetlands - M1	24.71	0.00	Not Assessed	3

GEPA 303(d) & 305(b) Data – 2018 IR

Table B.5a. Total Sizes of Waters Impaired by Various Cause/Stressor Categories
Type of Waterbody: Rivers and Streams (reported in miles)

Cause/Stressor Category	Size of Waters Impaired
Cause/Stressor Unknown	0
Unknown Toxicity	0
Pesticides	0
Priority Organics	0
Non-priority Organics	0
PCBs	1.19
Dioxins	0
Metals	1.11
Ammonia	1.11
Cyanide	0
Sulfates	0
Chloride	0
Other Inorganics	0
Nutrients	1.37
pH	0
Siltation	0
Organic Enrichment/low DO	5.52
Salinity/TDS/Chlorides	1.32
Thermal Modifications	*
Flow Alterations	0
Other Habitat Alterations	0
Pathogen Indicators	6.69
Radiation	*
Oil and Grease	0
Taste and Odor	*
Suspended Solids	1.32
Noxious Aquatic Plants (Macrophytes)	0
Excessive Algal Growth	0
Total Toxics	0
Turbidity	21.79
Exotic Species	0
Other (specify) : *Temperature*	1.11

Notes: zero (0) = Category applicable, but size of water in category is zero
dash (-) = Category applicable no data available
asterisk (*) = category not applicable

Table B.5b. Total Sizes of Waters Impaired by Various Cause/Stressor Categories
Type of Waterbody: Marine Bays (reported in square miles)

Cause/Stressor Category	Size of Waters Impaired
Cause/Stressor Unknown	0
Unknown Toxicity	0.40
Pesticides	2.61
Priority Organics	0
Non-priority Organics	0
PCBs	11.68
Dioxins	0.73
Metals	1.98
Ammonia	0
Cyanide	0
Sulfates	0
Chloride	0
Other Inorganics	0
Nutrients	0.70
pH	0
Siltation	0
Organic Enrichment/low DO	0.70
Salinity/TDS/Chlorides	0
Thermal Modifications	*
Flow Alterations	0
Other Habitat Alterations	0
Pathogen Indicators	0.70
Radiation	*
Oil and Grease	0
Taste and Odor	*
Suspended Solids	0
Noxious Aquatic Plants (Macrophytes)	0
Excessive Algal Growth	0
Total Toxics	1.98
Turbidity	0
Exotic Species	0
Other (specify)	
Secchi Visibility	0

Notes: zero (0) = Category applicable, but size of water in category is zero
dash (-) = Category applicable no data available
asterisk (*) = category not applicable

Table B.5c. Total Sizes of Waters Impaired by Various Cause/Stressor Categories
Type of Waterbody: Recreational Beaches (reported in shoreline miles)

Cause/Stressor Category	Size of Waters Impaired	
	2016	2017
Cause/Stressor Unknown	0	0
Unknown Toxicity	0	0
Pesticides	0	0
Priority Organics	0	0
Non-priority Organics	0	0
PCBs	0.65	0.65
Dioxins	0	0
Metals	0	0
Ammonia	0	0
Cyanide	0	0
Sulfates	0	0
Chloride	0	0
Other Inorganics	0	0
Nutrients	0	0
pH	0	0
Siltation	0	0
Organic Enrichment/low DO	0	0
Salinity/TDS/Chlorides	0	0
Thermal Modifications	*	*
Flow Alterations	0	0
Other Habitat Alterations	0	0
Pathogen Indicators	15.93	15.93
Radiation	*	*
Oil and Grease	0	0
Taste and Odor	*	*
Suspended Solids	0	0
Noxious Aquatic Plants (Macrophytes)	0	0
Excessive Algal Growth	0	0
Total Toxics	0	0
Turbidity	0	0
Exotic Species	0	0
Other (specify)	0	0

Notes: zero (0) = Category applicable, but size of water in category is zero
dash (-) = Category applicable no data available
asterisk (*) = category not applicable

GEPA 303(d) & 305(b) Data – 2018 IR

Table B6a. Total Sizes of Waters Impaired by Various Source Categories
Type of Waterbody: Rivers and Streams (reported in miles)

Source Category	Sized Impaired
Industrial Point Sources	0
Municipal Point Sources	0
Combined Sewer Overflows	0
Collection System Failure	0.21
Domestic Wastewater Lagoon	*
Agriculture	0
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	*
Silviculture	*
Construction	0.21
Urban Runoff/Storm Sewers	5.53
Resource Extraction	*
Land Disposal	1.16
Hydromodification	*
Habitat modification (non-hydromod)	0
Marinas and recreational Boating	*
Erosion from Derelict Land	21.58
Atmospheric Deposition	0
Waste Storage/Storage Tank Leaks	0
Leaking Underground Storage Tanks	0
Highway maintenance and Runoff	0
Spills (Accidental)	0
Contaminated Sediments	1.19
Debris and Bottom Deposits	0
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	0
Natural Sources	0
Recreational And Tourism Activities	21.58
Salt Storage Sites	*
Groundwater Loadings	*
Groundwater Withdrawal	*
Other Specify: Arson; Feral ungulates	21.58
Unknown Source	0
Sources Outside State Jurisdiction	*

Note:
asterisk (*) = category not applicable
dash (-) = Category applicable no data available
zero (0) = Category applicable, but size of water in category is zero

Table B 6b. Total Sizes of Waters Impaired by Various Source Categories
Type of Waterbody: Marine Bays (reported in square miles)

Source Category	Sized Impaired
Industrial Point Sources	0
Municipal Point Sources	0
Combined Sewer Overflows	0
Collection System Failure	0
Domestic Wastewater Lagoon	*
Agriculture	0
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	*
Silviculture	*
Construction	0
Urban Runoff/Storm Sewers	0.70
Resource Extraction	*
Land Disposal	*
Hydromodification	*
Habitat modification (non-hydromod)	0
Marinas and recreational Boating	*
Erosion from Derelict Land	0
Atmospheric Deposition	0
Waste Storage/Storage Tank Leaks	0
Leaking Underground Storage Tanks	0
Highway maintenance and Runoff	0
Spills (Accidental)	0
Contaminated Sediments	6.04
Debris and Bottom Deposits	0
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	0
Natural Sources	0
Recreational And Tourism Activities	1.98
Salt Storage Sites	*
Groundwater Loadings	0
Other Specify: toxic substance in seaweed	0.40
Other Specify: Groundwater seeps/springs	1.98
Unknown Source	5.64
Sources Outside State Jurisdiction	*

Note:
asterisk (*) = category not applicable
dash (-) = Category applicable no data available
zero (0) = Category applicable, but size of water in category is zero

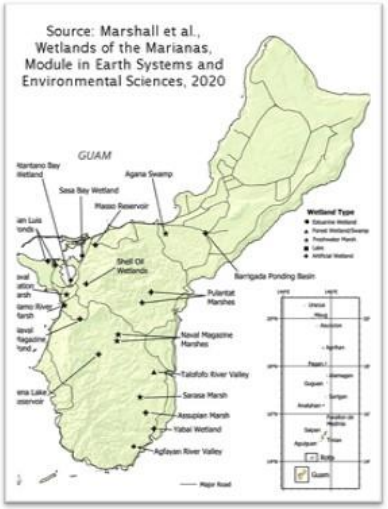
Table B6c. Total Sizes of Waters Impaired by Various Source Categories
Type of Waterbody: Recreational Beaches (reported in shoreline miles)

Source Category	Sized Impaired
Industrial Point Sources	0
Municipal Point Sources	0
Combined Sewer Overflows	0
Collection System Failure	0
Domestic Wastewater Lagoon	*
Agriculture	0
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	*
Silviculture	*
Construction	0
Urban Runoff/Storm Sewers	15.93
Resource Extraction	*
Land Disposal	*
Hydromodification	*
Habitat modification (non-hydromod)	0
Marinas and recreational Boating	*
Erosion from Derelict Land	0
Atmospheric Deposition	0
Waste Storage/Storage Tank Leaks	0
Leaking Underground Storage Tanks	0
Highway maintenance and Runoff	0
Spills (Accidental)	0
Contaminated Sediments	0
Debris and Bottom Deposits	0
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	0
Natural Sources	0
Recreational And Tourism Activities	0
Salt Storage Sites	*
Groundwater Loadings	*
Groundwater Withdrawal	*
Other Specify	0
Unknown Source	0.65
Sources Outside State Jurisdiction	*

Note:
asterisk (*) = category not applicable
dash (-) = Category applicable no data available
zero (0) = Category applicable, but size of water in category is zero

Enhancement Area Updates - Wetlands

- Any new management measures to report?
- Updates on Guam Wetland Conservation Plan?
- Ranked priorities indicates wetlands remain "medium" – does the group agree or want to discuss / evaluate further?



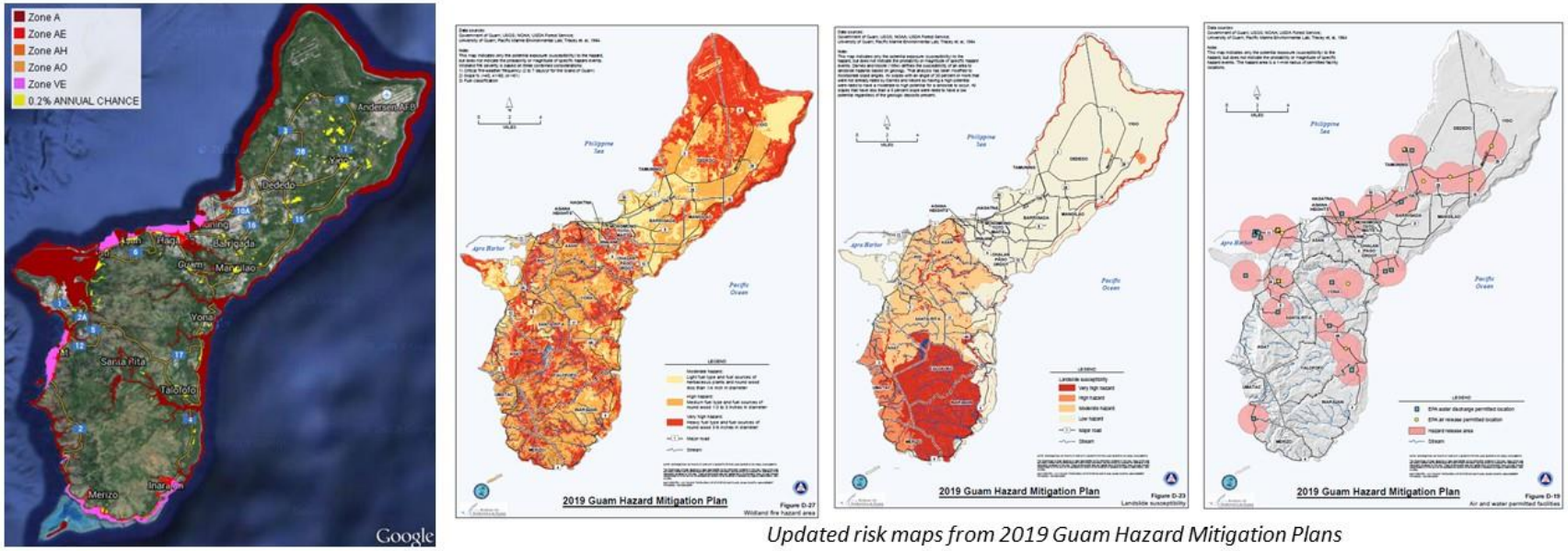
Significant Changes in Wetland Management

Management Category	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N
Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition)	N

High	
Medium	X
Low	

Enhancement Area Updates – Coastal Hazards

Section 309 Enhancement Objective: Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change. §309(a)(2)

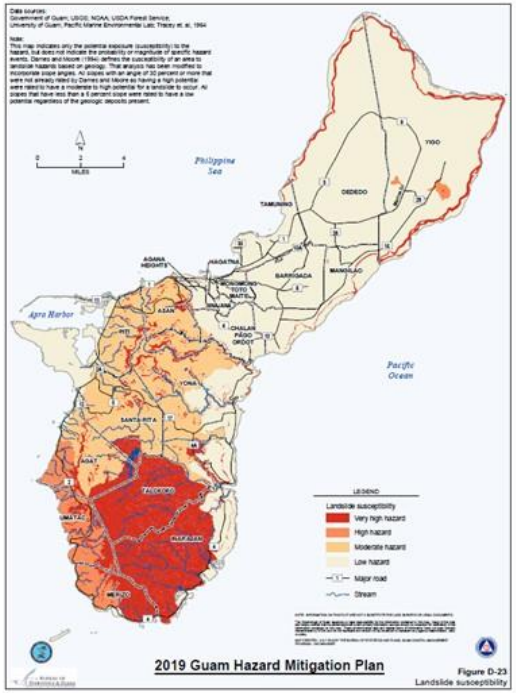


Updated risk maps from 2019 Guam Hazard Mitigation Plans

Enhancement Area Updates – Coastal Hazards

Section 309 Enhancement Objective: Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change. §309(a)(2)

General Level of Hazard Risk in the Coastal Zone	
Type of Hazard	General Level of Risk (H, M, L)
Flooding (riverine, stormwater)	H
Coastal storms (including storm surge)	H
Geological hazards (e.g., tsunamis, earthquakes)	M (Tsunami); H (Earthquakes)
Shoreline erosion	H
Sea level rise	H
Great Lakes level change	N/A
Land subsidence	L
Saltwater intrusion	H
Other (please specify) – Fire, Landslides	H (Fire), L-M (Landslides)??



Risk is defined as "the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

Does the group have modifications to suggest?

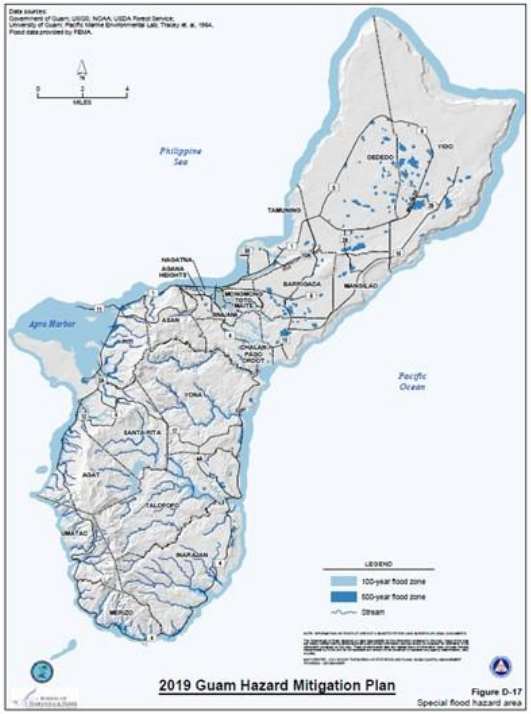
- How "risky" are landslides?
- What about Hazardous facility release?

Enhancement Area Updates – Coastal Hazards

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these that address:			
elimination of development/redevelopment in high-hazard areas	Y	Y	N
management of development/redevelopment in other hazard areas	Y	Y	N
climate change impacts, including sea level rise or Great Lake level change	Y	Y	N
Hazards planning programs or initiatives that address:			
hazard mitigation	Y	Y	Y
climate change impacts, including sea level rise or Great Lake level change	Y	Y	Y
Hazards mapping or modeling programs or initiatives for:			
sea level rise or Great Lake level change	Y	Y	Y
other hazards			

"High hazard areas are those areas that are defined and delineated as flood hazard zones by FEMA."

Does the group have updates or modifications to suggest?



Enhancement Area Updates – Coastal Hazards

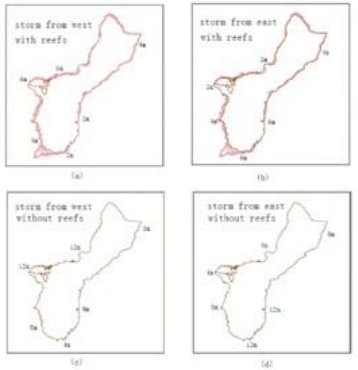
High	X
Medium	
Low	

Previously "medium" and now appears to be ranking as "high" – does this group agree with that assessment? Comments on reasons for this change?

Based on the characterization of coastal hazard risk, what are the <u>three most significant coastal hazards within your coastal zone</u>?

What is the geographic scope of the hazard, i.e., is it prevalent throughout the coastal zone, or are there specific areas most at risk?

	Type of Hazard	Geographic Scope
Hazard 1	Flooding (riverine, stormwater)	Tumon (economic), Merizo, Umatac (water volume), Harmon (highlighted in RiskMAP)
Hazard 2	Shoreline erosion / Coastal storms / Riverine and storm surge	Erosion at sandy western beaches; surge risks to Apra Harbor, Hagatna, Tamuning, Agat, Merizo, Umatac – (Riverine erosion: Santa Rita and Talofofo)
Hazard 3	Sea level rise / salt water intrusion	*Piti / Merizo (at 1ft) / Asan / Hagatna / Agat (at 3ft) / Tamuning / N. Aquifer)*



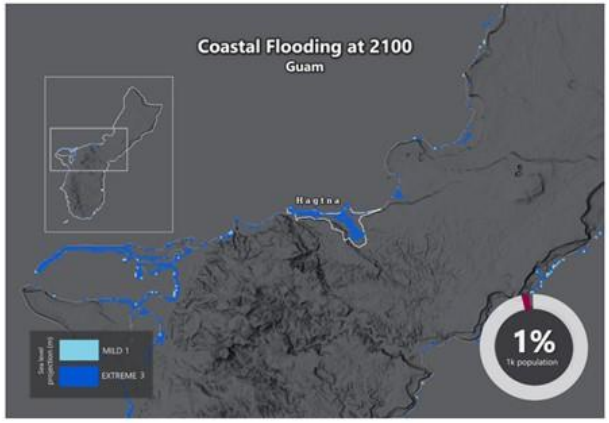
Why are these hazards currently the most significant coastal hazards within the coastal zone?

Enhancement Area Updates – Coastal Hazards

Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat?

Emerging Issue	Information Needed
Coral and storm surge protection?	Updated models re coral health and role in storm surge attenuation? Current data from UN Atlas of the Ocean, 2000
Flooding / erosion / shoreline change?	See updated CSI studies for Agat Bay and Comprehensive Flood Assessment (focusing on on Manell, Umatac and Namo)

Significant Changes to Coastal Hazard Management Planning Programs or Initiatives			
Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Change Since the Last Assessment (Y or N)
Hazard mitigation plans	Y	Y	Y – 2019 SSMP update
Sea level rise/Great Lake level change or climate change adaptation plans	Y	Y	N – But GGG currently working to address CC
Statewide requirement for local post-disaster recovery planning	N	N	N/A
Sediment management plans	Y	Y	Y – Silver Jackets / Stormwater Guide updates?
Beach nourishment plans	Y	Y	N – 2000 Plan, no updates
Special Area Management Plans (that address hazards issues)	Y	Y	Y – 2019 SSMP update; 2020 Agat Bay Regional Shoreline Assessment; Comprehensive Flood Assessment
Managed retreat plans	N	N	N/A
Other (please specify)			2017 GEPA Stormwater Management Guidance



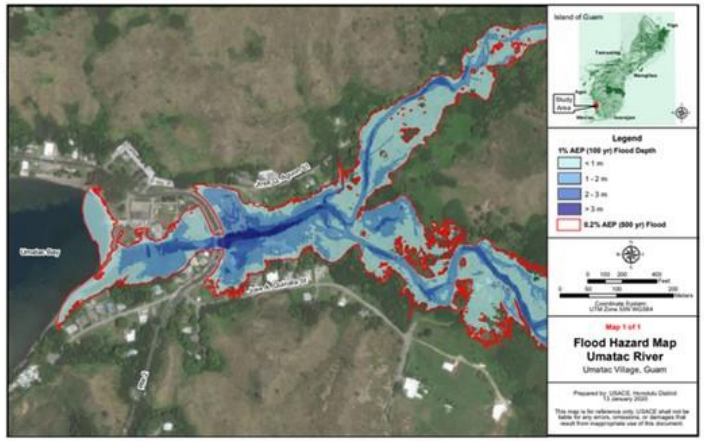
Sea level rise projections by 2100 for two scenarios with the amount of rise in meters indicated (mild = 1m; extreme = 3m). Population displacement indicated bottom right.

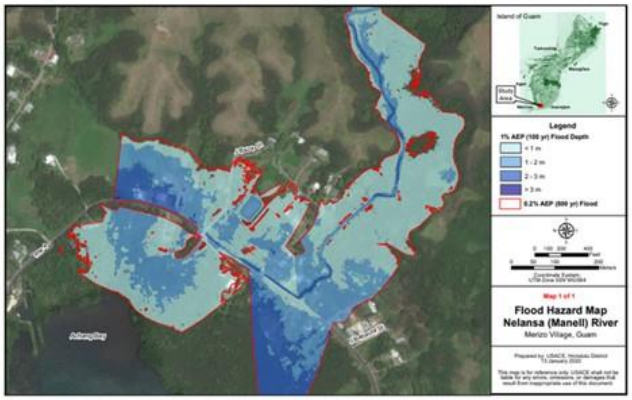
Enhancement Area Updates – Coastal Hazards

Significant Changes in Coastal Hazards Statutes, Regulations, and Policies			
Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	**Significant Change Since the Last Assessment (Y or N)**
Shorefront setbacks/no build areas	Y	Y	**N – 3m public access setback unchanged**
Rolling easements	N	N	**N**
Repair/rebuilding restrictions	N	N	**N**
Hard shoreline protection structure restrictions	N	N	**N**
Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)	N	N	**N**
Repair/replacement of shore protection structure restrictions	N	N	**N**
Inlet management	N	N	**N**
Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)	Y	Y	**Y**
Repetitive flood loss policies (e.g., relocation, buyouts)	N	N	**N**
Freeboard requirements	N	N	**N**
Real estate sales disclosure requirements	N	N	**N**
Restrictions on publicly funded infrastructure	N	N	**N**
Infrastructure protection (e.g., considering hazards in siting and design)	N	N	**N**
Other (please specify)			

Enhancement Area Updates – Coastal Hazards

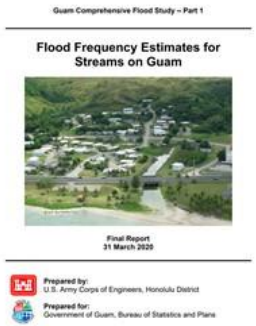
Significant Changes to Coastal Hazard Research, Mapping, and Education Programs or Initiatives			
Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	**Significant Change Since the Last Assessment (Y or N)**
General hazards mapping or modeling	Y	Y	Y – 2019 SSMP includes tsunami models
Sea level rise mapping or modeling	Y	Y	Y – SLR Vulnerability Viewer launched 2018
Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)	Y	Y	N
Hazards education and outreach	Y	Y	N – But FEMA RiskMAP pending
Other (please specify)			Y – USACE's Agat Bay Assessment and Comprehensive Flood Assessment (focusing on Manell, Umatac and Namo) published 2020 with revised area-specific flood return models (and/or note in CSI / SAMP sections?) -> Next steps for data integration into planning / decision-making support?

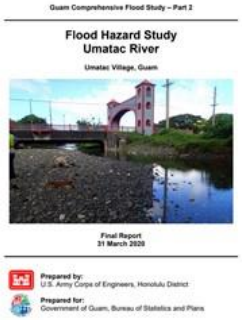


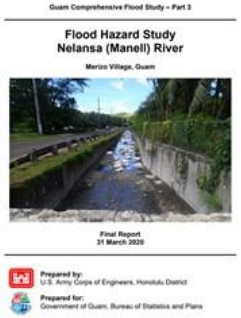


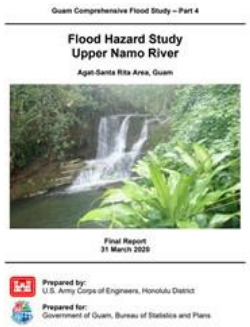
Enhancement Area Updates – Coastal Hazards

Priority Needs	Need? (Y or N)	Brief Explanation of Need/Gap
Research	Y re BMPs	New flood data, assessment of returns on investment / BCA to support prioritization and intervention decision making; shoreline loss and economic impacts
Mapping/GIS/modeling	Y re mapping	New data provided, opportunity to include in updated hazards mapping / decision support tool? Other mapping updates pending -> possible to leverage RiskMAP and other ongoing assessments to incorporate and support program change?
Data and information management	Y	*Recommendation: The coastal program should convene pre-application meetings and monthly project review meetings and identify other issue areas where the program might coordinate or convene stakeholders and resource management agencies*
Training/Capacity building	Y	*Recommendation: Guam Coastal Management Program staff members should seek and receive training to address high-priority issues and create mechanisms to provide assistance for regulatory revisions and training opportunities to ensure coastal resources and comprehensive planning principles are mainstreamed across agency actions*
Decision-support tools	Y	*Recommendation: BSP should role out permitting "app" with updated layers to support development project scoping and digitization of application, permitting, and enforcement systems*
Communication and outreach	Y	*Recommendation: Invest in education so the community understands what we need to protect in order to support management plans and actions.*
Other (specify)		***Any other emerging issues or information needed?***









Enhancement Area Updates – Public Access

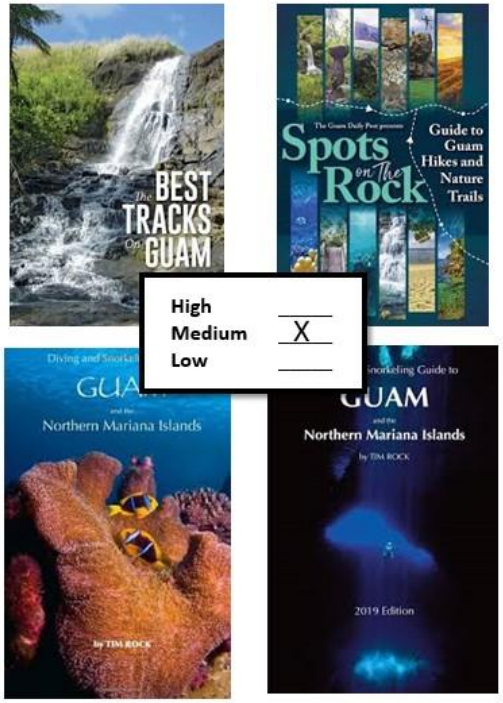
Section 309 Enhancement Objective: Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value. §309(a)(3)

Public Access Status and Trends			
Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, unkwn)	Cite data source
Beach access sites	211	↓	Observation – continued reports of enforcement / access concerns, restricted access on base
Shoreline (other than beach) access sites	99	↓	Observation / news reports regarding base access restrictions
Recreational boat (power or nonmotorized) access sites	8	No change	BSP
Number of designated scenic vistas or overlook points	14	No change	Dept. of Parks and Recreation
Number of fishing access points (i.e. piers, jetties)	8	No change	Observation
Coastal trails/ boardwalks (Please indicate number of trails/boardwalks and mileage)	18+	Unknown	Recent Guam trail guides published listing numerous trails, many of which are restricted access (base access only)
Number of acres parkland/open space	184 sites, 1,461.93 acres of DPR Parks, National Parks System 926 acres	Unknown	Department of Parks and Recreation 2006 Comprehensive Outdoor Recreation Plan
Access sites that are Americans with Disabilities Act (ADA) compliant	At least 2	↑	War in the Pacific National Historical Park website specifically mentions ADA access – no other sites listed / observed, although notes commitment by NPS to make facilities and services accessible One (1) ADA fishing ramp
Other (please specify)			

Enhancement Area Updates – Public Access

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	Y	N – although some increasing access issues
Operation/maintenance of existing facilities	Y	Y	N
Acquisition/enhancement programs	N	N	N

Public Access Guide	Printed	Online	Mobile App
State or territory has? (Y or N)	Y	N	N
Web address (if applicable)	N/A	N/A	N/A
Date of last update	2019 Commercial Guide updates (hiking & snorkeling / diving)	N/A	N/A
Frequency of update	N/A	N/A	N/A

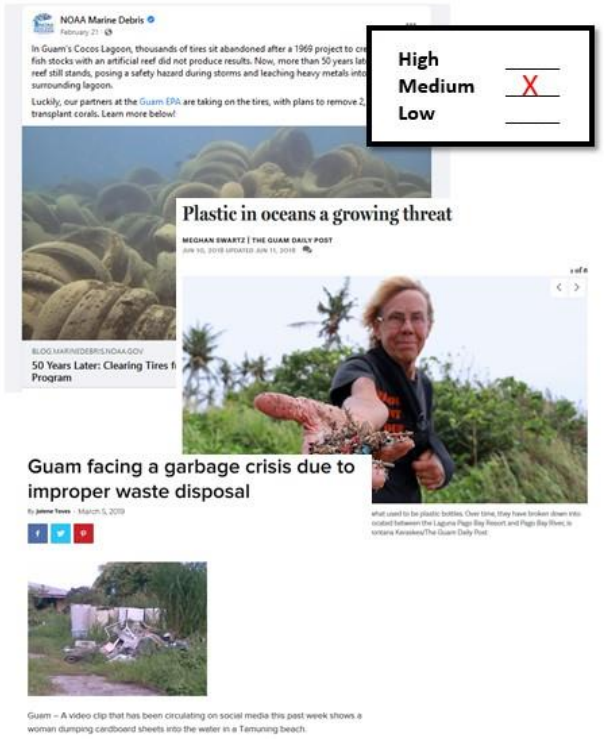


Enhancement Area Updates – Marine Debris

Section 309 Enhancement Objective: Reducing marine debris entering the nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris. §309(a)(4)

Source of Marine Debris	Significance of Source (H, M, L, unknwn)	Type of Impact (aesthetic, resource damage, user conflicts, other)	Change Since Last Assessment (↑, ↓, -, unkwn)
Beach/shore litter	H	Aesthetic, Resource damage, health	↑?
Land-based dumping	H	Aesthetic, Resource damage, Health	↑
Storm drains and runoff	H	Aesthetic, Resource damage, Health	↑
Land-based fishing (e.g., fishing line, gear)	M	Aesthetic, Resource damage	No change
Ocean/Great Lakes-based fishing (e.g., derelict fishing gear)	L	Resource Damage	No change
Derelict vessels	M	Resource Damage	↑
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	L	Resource Damage	No change
Hurricane/Storm	H	Aesthetic, Resource Damage	No change
Tsunami	L	Aesthetic, Resource damage, health	No change
Other (please specify)	UXO	Health, resource damage	No change

Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Marine debris statutes, regulations, policies, or case law interpreting these	Y	N	Y – Guam Litter Law citation booklets issued and trainings held in 2019
Marine debris removal programs	Y	N	Y – Marine debris grant for Cocos Island tires



Enhancement Area Updates – Cumulative & Secondary Impacts

Section 309 Enhancement Objective: Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources. §309(a)(5)

High	X
Medium	
Low	

Trends in Coastal Population and Housing Units

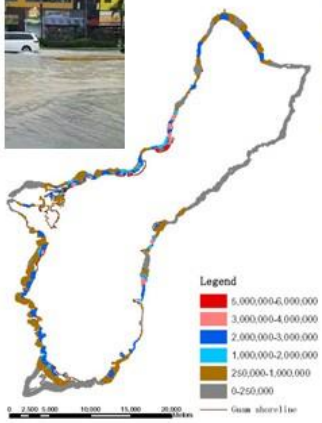
	2000	2010	Percent Change (2000-2010)
Number of people	154,805	159,358	2.9% increase since 2000
Number of occupied housing units	38,769	42,026	.84% increase in occupied housing since 2000

Pacific Region

Region	Counties	Year	Population		Housing	
			Total	% Change	Total	% Change
Pacific Region	Pacific Region counties	2012	1,394,804	2.12%	525,678	3.26%
		2017	1,424,393		542,815	

Trends in Coastal Population and Housing Units

	2000	2010	Percent Change (2000-2010)
Number of people	154,805	159,358	+2.85%
Number of housing units	47,677	50,567	+5.72%



Enhancement Area Updates – Cumulative & Secondary Impacts

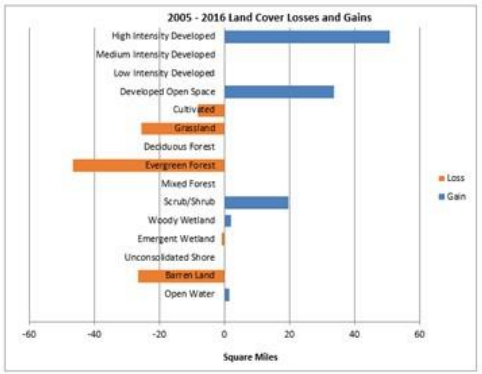
Identify change – C-CAP 2005 - 2011

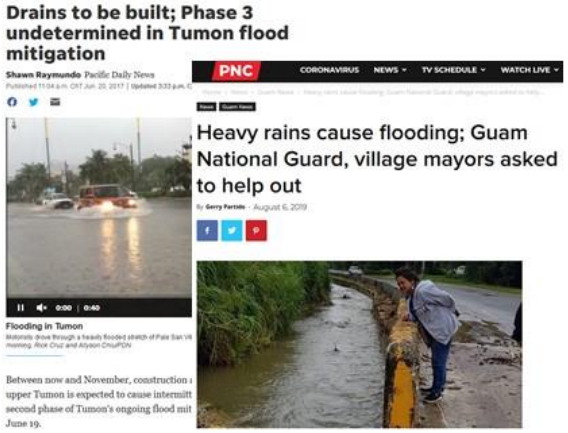
2016 C-CAP Data obtained and processing pending

Distribution of Land Cover Types in Coastal Counties		
Land Cover Type	Land Area Coverage in 2011 (Square Miles)	Gain/Loss Since 2006 (Square Miles)
Developed, High Intensity	20.29	1.09
Developed, Low Intensity	N/A	N/A
Developed, Open Space	22.74	0.43
Grassland	41.53	0.25
Scrub/Shrub	18.07	0.33
Barren Land	4.41	-2.00
Open Water	20.40	0.06
Agriculture	0.96	-0.25
Forested	95.17	0.06
Woody Wetland	4.78	0.08
Emergent Wetland	1.53	-0.05

Development Status and Trends for Coastal Counties			
	2006	2011	Percent Net Change
Percent land area developed	18.06	18.72	+3.67%
Percent impervious surface area	8.35	8.83	+5.7%

Development Status and Trends for Coastal Counties			
	2005	2016**	Percent Net Change
Percent land area developed	18.22	19.43	+6.64%
Percent impervious surface area	17.17*	18.66	+8.68%





Enhancement Area Updates – Cumulative & Secondary Impacts

How Land Use Is Changing in Coastal Counties	
Land Cover Type	**Land Change Between 2005-2016** (Square Miles)
Barren Land	0.65 square miles
Emergent Wetland	-0.035 square miles
Woody Wetland	0.05 square miles
Open Water	0.06 square miles
Agriculture	-0.03 square miles
Scrub/Shrub	-1.53 square miles
Grassland	-0.84 square miles
Forested	-0.88 square miles

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N	N	N
Guidance documents	Y	N	Y – 2017 update to GEPA stormwater management BMPs
Management plans (including SAMPs)	Y	N	N

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Methodologies for determining CSI impacts	N	N	N
CSI research, assessment, monitoring	N	N	N
CSI GIS mapping/database	N	N	N
CSI technical assistance, education and outreach	Y	Y	Y – Stormwater guidance from GEPA in 2017; additional updates and management efforts underway
Other (please specify)			

Our View: GovGuam must do much more to prevent flooding

Pacific Daily News

Governor directs Guam National Guard, Department of Public Works to address flooding

Jerick Sablan Pacific Daily News

Flooding in Tamuning

Enhancement Area Updates – Cumulative & Secondary Impacts

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N	N	N
Guidance documents	Y	N	Y – 2017 update to GEPA stormwater management BMPs
Management plans (including SAMPs)	N	N	N

	Stressor/Threat	Coastal Resource(s)/Use(s) Most Threatened	Geographic Scope (throughout coastal zone or specific areas most threatened)
Stressor 1	Stormwater Runoff	Coral reef, aquatic resources, water quality, N. Guam Lens Aquifer	Throughout the island
Stressor 2	Coastal Development	Habitat (shorelines), native forest, wetlands, public access, aquifer	Throughout CZ, especially Northern Guam and Tumon MPA
Stressor 3	Invasive Species	Native forest – terrestrial habitat	Throughout the island

Emerging Issue	Information Needed
…?	

Priority Needs	Need? (Y or N)	Notes
Research	Y	
Mapping/GIS	Y	
Data and information management	Y	
Training/Capacity building	Y	
Decision-support tools	Y	
Communication and outreach	Y	
Other (specify)		

Priority Data Gap(s)?

Management Priorities? "Considering changes in cumulative and secondary impact threats and management since the last assessment and stakeholder input, identify and briefly describe the top one to three management priorities where there is the greatest opportunity for the CMP to improve the effectiveness of its management effort to better assess, consider, and control the most significant threats from cumulative and secondary impacts of coastal growth and development."

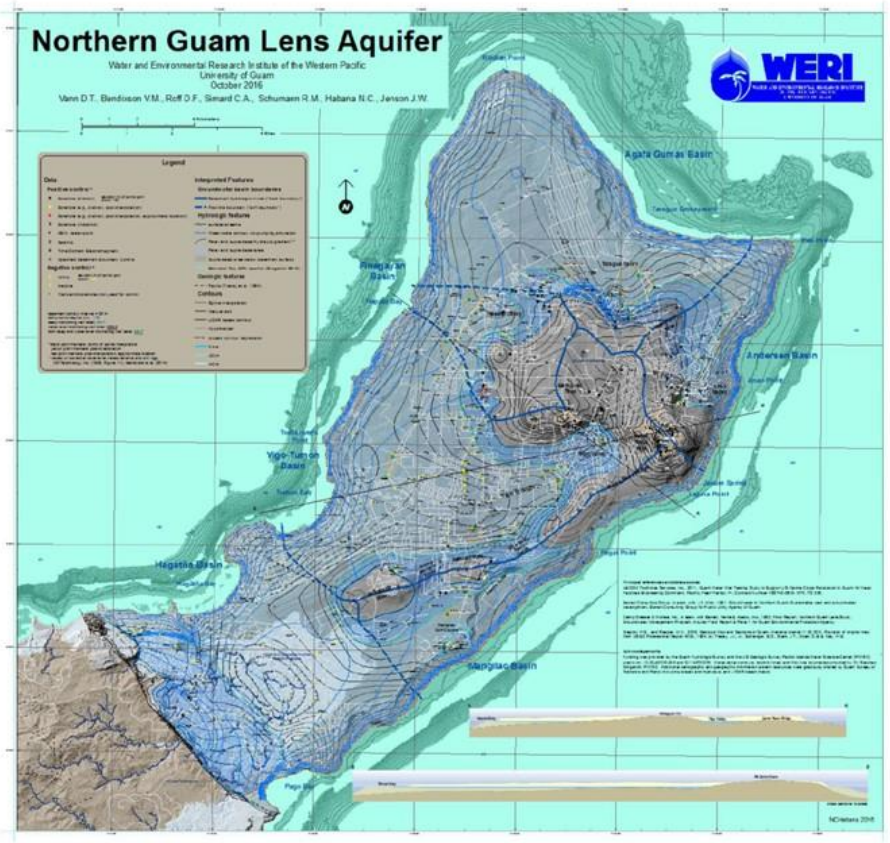
Enhancement Area Updates - SAMPs

Section 309 Enhancement Objective: Preparing and implementing special area management plans for important coastal areas. §309(a)(6)

Prior 309 Description	Major conflicts/issues
Fragile Coastal / Marine Resource Areas - Coral Reefs /Bays/ Lagoons/ Shoreline	Overharvesting, near-shore development, increased recreation, poor fishing practices, storms, shoreline erosion, flooding, non-point pollution
Aquifer Recharge Area (Northern Guam Lens Aquifer)	Agriculture, development, overuse, military build-up
Fragile Terrestrial Areas (wetlands, limestone forest, wildlife habitats and historic sites)	Development, Military, Ancestral Lands and Chamorro Land Trust needs, water sports and tropical beach recreation, and outright vandalism, graffiti and theft of historic properties in historic sites.
Priority Watersheds (Piti- Asan, Manell-Geus, Pago Bay, Ugum, Fouha, Toguan)	Fires, poor land management, increasing development, flooding, invasive species

Geographic Area	Opportunities for New or Updated Special Area Management Plans Major conflicts/issues
MPAs, High-value reefs	Major issues include overharvesting, near-shore development, increased recreation, poor fishing practices, storms, shoreline erosion, flooding, non-point pollution. Management opportunities include the development and adoption of a Seashore Protection Plan which has been authorized since 1974 but has never been produced. Latest benthic habitat maps were done in 2004 so opportunity to update that to support identification and management at MPAs / High values reefs
N. Guam aquifer recharge area	Major issues include agriculture, development, overuse, military build-up, illegal dumping; plans that are not incorporated into the Guam Comprehensive Development Plan and therefore BSP-GCMP does not have specific enforcement authorities for stand-alone planning efforts. Management opportunities for southern Guam include the development and adoption of a Guam Forests System Plan. Northern Guam could include updating and adopting the 2009 North and Central Guam Land Use Plan. Comprehensive Development Plan guides all development so updates should be incorporated and leveraged to become special area management plans to support establishment of enforceable policies
Fragile Areas (wetlands, limestone forest, wildlife habitats and historic sites) (specifically…?)	Major issues include development, Military, Ancestral Lands and Chamorro Land Trust needs, water sports and tropical beach recreation, and outright vandalism, graffiti and theft of historic properties in historic sites. Management opportunities include the development and adoption of a Seashore Protection Plan and a Guam Forests System Plan…
Priority Southern watershed management areas (Piti- Asan, Manell-Geus, Pago Bay, Ugum, Fouha,Toguan)	Major issues include fires, poor land management, increasing development, flooding, invasive species Management opportunities include the development and adoption of a Southern Development Master Plan…

Enhancement Area Updates – N. Aquifer SAMP



Guam's Northern aquifer "One of the world's best"

By **Gia Righetti** - April 20, 2018

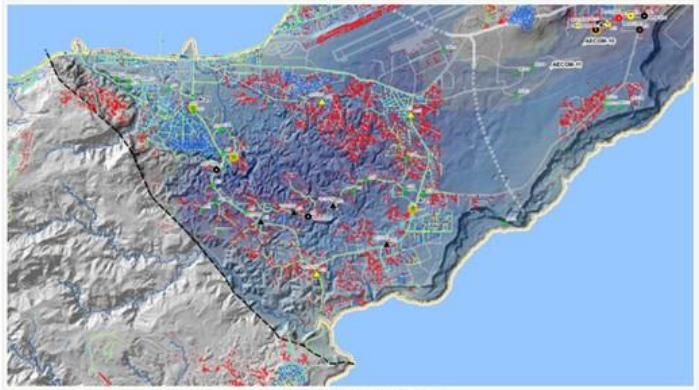
Guam – Dr. John Jenson, Director of the Water and Environmental Research Institute of the Western Pacific was the guest speaker at the Rotary Club of Northern Guam's membership meeting on Wednesday.

Speaking on the island's Northern lens aquifer he described our aquifer as "one of the world's best." The Northern lens aquifer provides the island with 90% of our drinking water, while the other 10% is supplied by Fena reservoirs collection from rivers and streams.

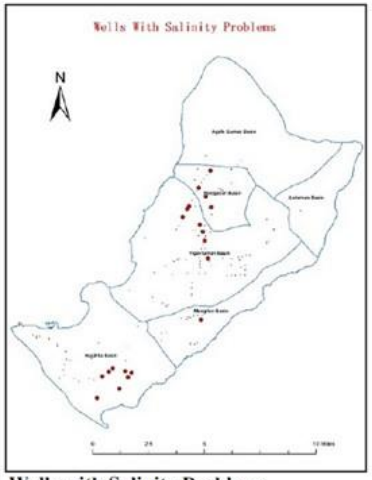
Enhancement Area Updates – N. Aquifer SAMP

NGLA Maps: Wastewater Sources and Production Well Nitrates

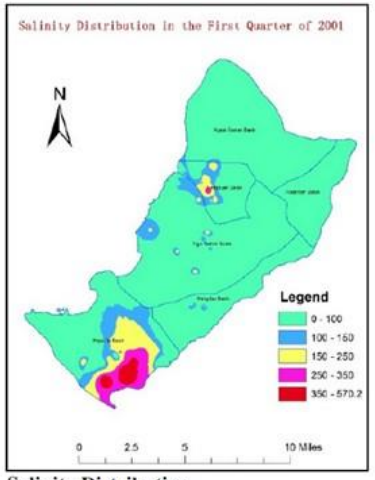
Development over the NGLA is a concern of possible wastewater contamination. The aquifer's water resource in a durable karst plateau provides an economic access for development, but the residential and business wastewater discharged above it may be a threat to the freshwater resource. Increased and dense development must be accessed as it may intensify wastewater discharge.



NGLA wells and wastewater system



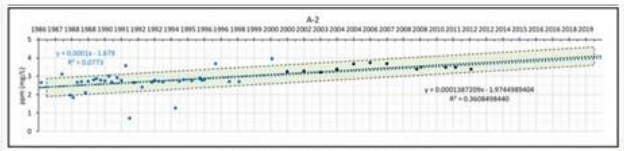
Wells with Salinity Problems



Salinity Distribution

Major tasks and periods of activity

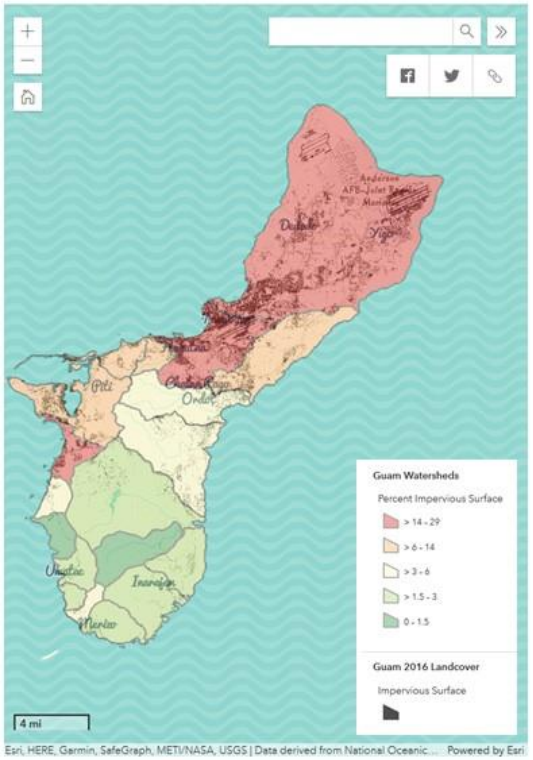
Tasks	2017	2018	2019	2020
	Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4
Task 1:				
Well Specifications				
Sustainment requirements				
Technical support for well construction				
Water-level equipment removal and reinstall				
Task 2:				
Logistics and planning				
Geophysical logging and interpretation				
Report preparation and publication				



Production wells nitrate data analysis

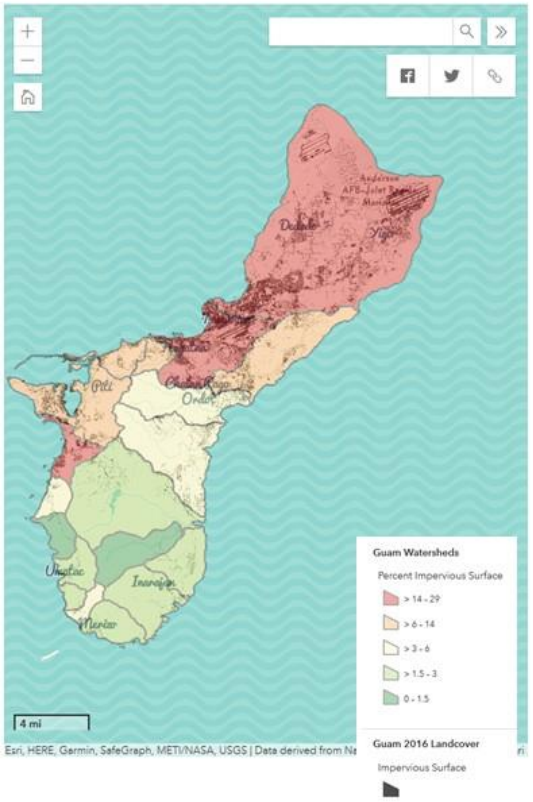
Enhancement Area Updates – SAMPs - Watersheds

Watershed	IC 2005	IC 2016	% Change	IC Acres
Northern	12.84%	14.24%	1.40%	+628.8
Agana	27.82%	29.31%	1.49%	+129.7
Fonte	12.17%	12.89%	0.72%	+11.4
Piti-Asan	11.52%	12.22%	0.70%	+14
Apra	12.83%	13.63%	0.80%	+66.3
Agat	15.32%	15.73%	0.41%	+10.3
Taelayag	3.89%	4.16%	0.27%	+4.4
Cetti	0.92%	1.05%	0.13%	+2.6
Umatac	1.76%	1.85%	0.09%	+2.0
Toguan	2.19%	2.45%	0.26%	+2.4
Gues	4.44%	4.72%	0.28%	+3.2
Manell	1.46%	1.58%	0.12%	+3.8
Inarajan	1.50%	1.67%	0.17%	+9.6

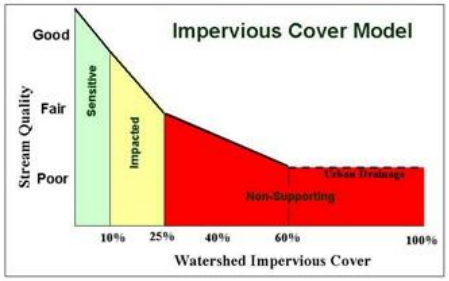


Watershed	IC 2005	IC 2016	% Change	IC Acres
Dandan	1.75%	2.62%	0.87%	+36.4
Ugum	0.13%	0.21%	0.08%	+4.3
Talofofo	1.80%	2.04%	0.24%	+36.0
Ylig	5.08%	5.65%	0.57%	+58.0
Pago	4.85%	5.68%	0.83%	+55.1
Mangilao	7.84%	9.22%	1.38%	+120.4

	IC 2016	IC Acres
All Watersheds	~18955	14.6%



Note Center for Watershed Protection's 2003 study, Impervious Cover as a Indicator and Tool of Watershed Protection indicates strong correlations between IC and stream quality…



Enhancement Area Updates - SAMPs

High	X
Medium	
Low	

Significant Changes in Special Area Management			
Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
SAMP policies, or case law interpreting these	Y	Y	N
SAMP plans	Y	Y	N

What are **the one to three most significant geographic areas facing existing or emerging challenges that would benefit from a new or revised special area management plan** (SAMP) or better implementation of an existing SAMP?

	Geographic Scope (within an existing SAMP area (specify SAMP) or within new geographic area (describe new area))	Challenges
Geographic Area 1	Coral Reefs including Guam's MPA	Lack of enforcement, shore development, increased recreation, poor fishing practices, storms, outdated storm water regulations
Geographic Area 2	Fragile Areas (limestone forest and terrestrial habitat)	Development, limited areas for reforestation efforts, use conflict, coordinating regulatory processes
Geographic Area 3	Priority Watersheds	Additional data needed to complete watershed plans for remaining priority watersheds, need for enhanced natural resource protection, education and outreach

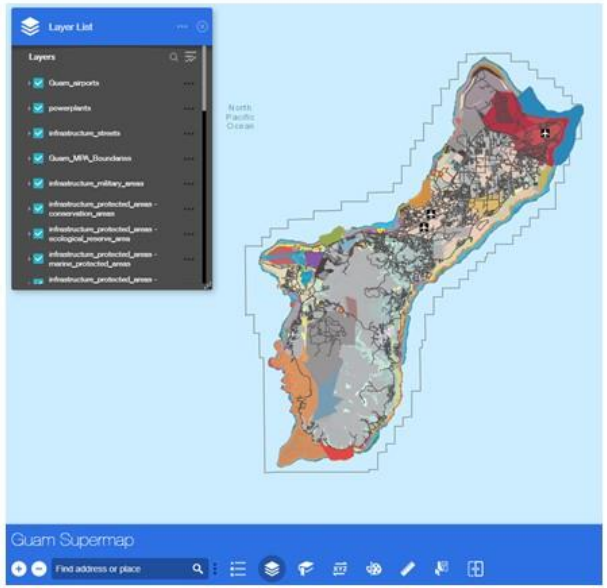
Significant Changes Related to Special Area Management Panning			
Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	**Significant Changes Since Last Assessment (Y or N)**
SAMP research, assessment, monitoring	Y	Y	**N**
SAMP GIS mapping/database	Y	Y	**N**
SAMP technical assistance, education, and outreach	Y	Y	**N**
Other (please specify)			

Enhancement Area Updates - SAMPs

High	X
Medium	
Low	

Data gaps? Needs / alignment opportunities? Management Priorities?

Priority Needs	Need? (Y or N)	Notes
Research	Y	WERI research ongoing but funding limits; other needs include…? Understanding source and amount of storm water directly entering Tumon Bay. Innovative solutions to manage storm water in low lying areas and areas at sea level. Impact from climate change and sea level rise to infrastructure located underground and to hotels. Pilot project to test innovative products such as pervious cement to manage flooding.
Mapping/GIS	Y	Guam "SuperMap" exists but limited layers / application – CREST updates pending. Other needs include…? Update GIS data to include land use and impervious surface. Location of storm water infrastructure, land ownership, shoreline change.
Data and information management	Y	WERI publishes annual reports for N. Aquifer; Watershed management plan and stormwater data needs include…? Historic data. Access to GIS data. Better data management that include scheduled updates to data sets.
Training/Capacity building	Y	Numerous respondents emphasized the need for training regarding the role of ecosystems (eg wetlands, shorelines, reefs) in coastal protection, BMPs in stormwater management, and additional capacity building across agencies – details? Training on storm water BMP for contractors
Decision-support tools	Y	2020 BSP Program report indicated opportunities to build out GIS tools for decision-support in permitting – does the group agree this is an actionable need? Others to include? GIS based tools for determining areas of future growth. 3-D modeling for siting of future development, and determining increase flooding potential
Communication and outreach	Y	See also notes on "training" Information translated for the public to understand the impact of additional pervious surfaces.
Other (specify)		



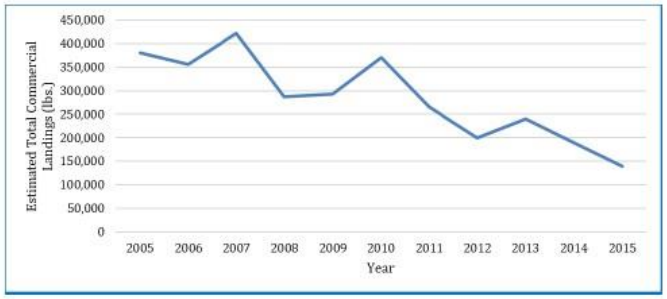
Existing WMP -> Piti-Asan; Manell-Geus; Toguan
- Updates needed?
- Other priorities? (Shoreline Reserve)

Enhancement Area Updates – Ocean Resources

Section 309 Enhancement Objective: Planning for the use of ocean resources. §309(a)(7)

Status of Ocean and Great Lakes Economy for Coastal Counties (2015)

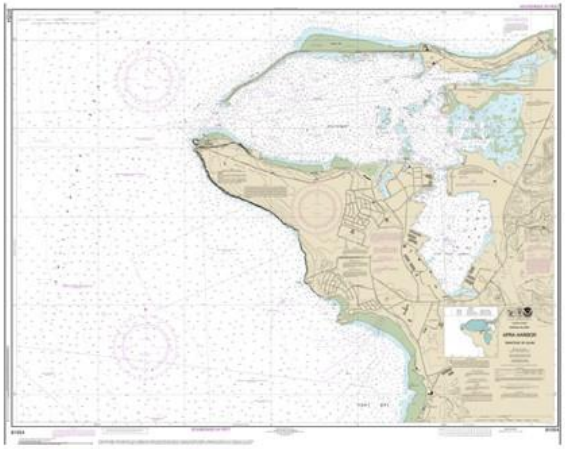
	All Ocean Sectors	Living Resources	Marine Construction	Ship & Boat Building	Marine Transportation	Offshore Mineral Extraction	Tourism & Recreation
Employment (# of Jobs)	19,592 – 21,364	112-218	554-703	20-118	1,195-1,539	0-19	17,711-18,767
Establishments (# of Establishments)	1,092	23	53	2	45	1	968
Wages (Millions of Dollars)	*Data not available*						
GDP (Millions of Dollars)		*Data not available*	*Data not available*	*Data not available*	*Data not available*	*Data not available*	$1.7B in Tourism Economy Sales; $2.3B in Visitor Spending in Business Sales

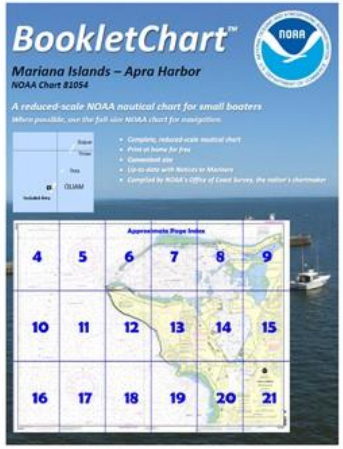


One of many container ships transporting cargo to Guam.

Enhancement Area Updates – Ocean Resources

Uses within Ocean or Great Lakes Waters	
Type of Use	**Number of Sites**
Federal sand and gravel leases (Completed)	0
Federal sand and gravel leases (Active)	0
Federal sand and gravel leases (Expired)	0
Federal sand and gravel leases (Proposed)	0
Beach Nourishment Projects	0
Ocean Disposal Sites	0
Principle Ports (Number and Total Tonnage)	1, 1M tons in containerized cargo and 170,000 tons in breakbulk cargo for approximately 1.2M revenue tons in FY17
Coastal Maintained Channels	1, Apra Harbor
Designated Anchorage Areas	Naval, Explosive, and General Anchorages within Apra Harbor
Danger Zones and Restricted Areas	1 existing Restricted Area (Apra Harbor); 1 new Danger Zone (Finegayan Danger Zone, 2.36m, July, 2020)
Other (please specify)	





Enhancement Area Updates – Ocean Resources

Significant Changes to Ocean Resources and Uses	
Resource/Use	Change in the Threat to the Resource or Use Conflict Since Last Assessment (↑, ↓, -, unkwn)
Benthic habitat (including coral reefs)	↑
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	↑
Sand/gravel	Unknown
Cultural/historic	↑
Other (please specify)	
Transportation/navigation	↑
Offshore development	Unknown
Energy production	Unknown
Fishing (commercial and recreational)	↑
Recreation/tourism	↑
Sand/gravel extraction	Unknown
Dredge disposal	Unknown
Aquaculture	No change
Other –"Danger zone" / access restrictions	↑

Finegayan Small Arms Range, on the Northwestern Coast of Guam; Danger Zone

A Rule by the Engineers Corps on 07/20/2020

PUBLISHED DOCUMENT

AGENCY:

U.S. Army Corps of Engineers, DoD.

ACTION:

Final rule.

SUMMARY:

The Corps of Engineers (Corps) is amending its danger zone regulations to establish a danger zone in the Pacific Ocean adjacent to the existing Finegayan Small Arms Range at Naval Base Guam telecommunication site on the northwestern coast of Guam. The danger zone is located entirely within the Pacific Ocean, comprising 892 acres and extending 2,36 miles into the ocean from the high tide line. Establishment of the danger zone will intermittently prohibit vessels from lingering in the danger zone when the small arms range is in active use in order to ensure public safety.

DATES:

Effective August 19, 2020.

DOCUMENT DETAILS

Printed version: PDF

Publication Date: 07/20/2020

Agencies: Department of the Army, Corps of Engineers

Dates: Effective August 19, 2020

Effective Date: 08/19/2020

Document Type: Rule

Document Citation: 85 FR 43688

Page: 43688-43692 (5 pages)

CFR: 33 CFR 334

Agency/Docket Number: COE-2018-0005

Major Contributors to an Increase in Threat or Use Conflict to Ocean Resources													
Resource	**Major Reasons Contributing to Increased Resource Threat or Use Conflict (Note All that Apply with "X")**												
	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm & Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Other (Specify)
Benthic habitat and Living marine resources	X		X	X	X		X	X			X	Climate impacts, Illegal fishing, in-water military activities
Cultural / historic	X											
Fishing (commercial and recreational)	X		X	X	X							Overfishing, habitat degradation
Recreation/tourism	X		X									
"Danger Zone" / Access Restrictions	X											Increased build-up activities impacting public access and historic / cultural resources

Enhancement Area Updates – Ocean Resources

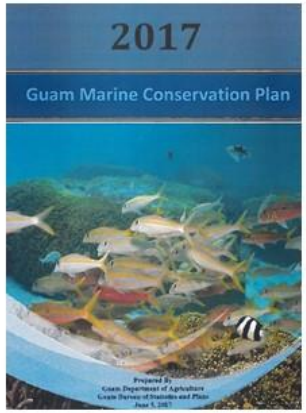
Major Contributors to an Increase in Threat or Use Conflict to Ocean Resources												
Resource	Major Reasons Contributing to Increased Resource Threat or Use Conflict (Note All that Apply with "X")											
	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm & Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Other (Specify)
Benthic habitat and Living marine resources	X		X	X	X		X	X			X	Climate impacts, Illegal fishing, in-water military activities
Cultural / historic	X											
Fishing (commercial and recreational)	X		X	X	X							Overfishing, habitat degradation
Recreation/tourism	X		X									
"Danger Zone" / Access Restrictions	X											Increased build-up activities impacting public access and historic / cultural resources

	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm and Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Other-Storms and Typhoons	Other-Military activities	Other-Ocean temperatures	Other-derelict vessels
Benthic habitat (including coral reefs)	X		X	X	X		X	X			X	X	X	X	X
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	X		X	X	X		X				X	X	X	X	
Transportation/ navigation									X			X	X		
Offshore development (including underwater cables and pipelines)												X			
Recreation/tourism	X		X				X				X	X	X	X	
Cultural / historic resources	X		X	X	X								X		
"Danger Zone" / Access restrictions	X												X		

Enhancement Area Updates – Ocean Resources

Significant Changes to Management of Ocean and Great Lakes Resources			
Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Regional comprehensive ocean management plans	Y	N	N
State comprehensive ocean management plans	Y	N	N
Single-sector management plans	Y	Y	Y – 2016 publication of Tourism Strategic Plan (due to ocean focus)

Comprehensive Ocean Management Plan	State Plan	Regional Plan
Completed plan (Y/N) (If yes, specify year completed)	Y, Marine Conservation Plan, 2017 (Guam EEZ)	N
Under development (Y/N)	N	Y – Marianas Trench MMP; Ecosystem Management Plan
Web address (if available)	https://www.regulations.gov/document?D=NOAA-NMFS-2017-0075-0003	https://www.fisheries.noaa.gov/management-plan/mariana-archipelago-ecosystem-management-plan See also Pacific Islands Regional Planning Body (2014 Charter) www.pacificislandsrpb.org
Area covered by plan		Mariana Archipelago - Guam & CNMI




NEWS

Deep-water buoys placed to aid fishermen

Steve Limtiaco Pacific Daily News

High	
Medium	X
Low	

Enhancement Area Updates – Energy & Government Facility Siting

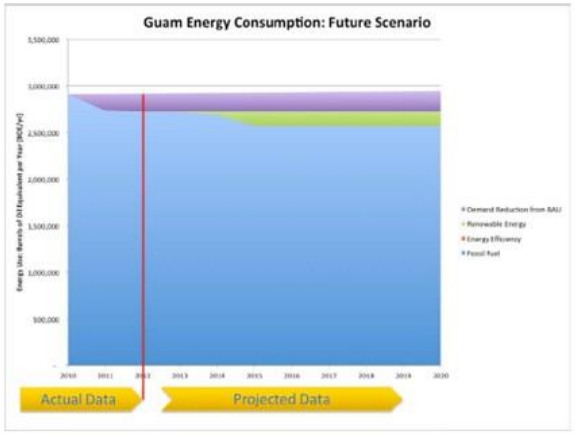
Section 309 Enhancement Objective: Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance. §309(a)(8)

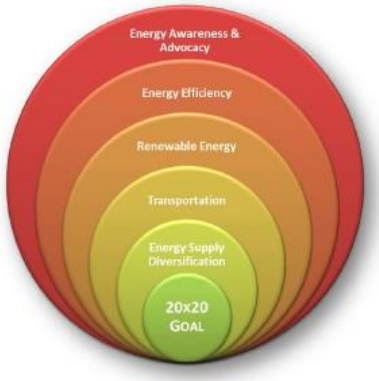
Type of Energy Facility/Activity	Exists in Coastal Zone (# or Y/N)	Change in Existing Facilities/Activities Since Last Assessment (↑, ↓, -, unkwn)	Proposed in Coastal Zone (# or Y/N)	Change in Proposed Facilities/Activities Since Last Assessment (↑, ↓, -, unkwn)
Pipelines	Y (at least 2)	↑	Unknown	↑
Electrical grid (transmission cables)	Y	↑	Y	↑
Ports	Y	Unknown	Unknown	Unknown
Liquid natural gas (LNG)	N	No change	Y	↑
Oil and gas	Y	↑	Y	↑
Coal	N	No change	N	No change
Nuclear	N	No change	N	No change
Wind	N	↑	Y	↑
Wave	N	No change	N	No change
Tidal	N	No change	N	No change
Current (ocean, lake, river)	N	No change	N	No change
Hydropower	N	No change	N	No change
Ocean thermal energy conversion	N	No change	N	No change
Solar	Y (at least 25MW; 66MW by some reports)	↑	Y	↑
Biomass	N	No change	N	No change
Other (please specify) ADD SOLID WASTE MANAGEMENT?				

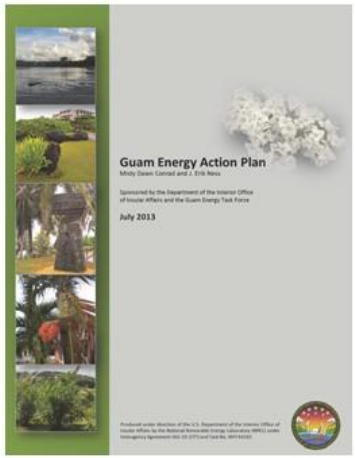
Enhancement Area Updates – Energy & Government Facility Siting

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	N	N	N
State comprehensive siting plans or procedures	Y	Y	Y

High ____
Medium X?
Low ____







Enhancement Area Updates – Aquaculture

Section 309 Enhancement Objective: Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable states to formulate, administer, and implement strategic plans for marine aquaculture. §309(a)(9)

High	
Medium	X
Low	

Status and Trends of Aquaculture Facilities and Activities

Type of Facility/Activity	Number of Facilities	Approximate Economic Value	Change Since Last Assessment (↑, ˜, -, unkwn)
Aquaculture feasibility study pending as of July 2020, no updates reported	3 (In 2013 State Statistical Yearbook, BSP)	$460,500 (In 2013, State Statistical Yearbook, BSP), but recent renewed interest -ADD GADTC	↑

Significant Changes in Aquaculture Management

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Aquaculture comprehensive siting plans or procedures	Y	N	N – But feasibility study underway
Other aquaculture statutes, regulations, policies, or case law interpreting these	Y	N	Y – Guam Aquaculture Task Force created by Executive Order in April 2019

Outdoor concrete tanks, left, are shown at the Guam Aquaculture Development and Training Center in Fadian, Mangilao. Gov. Lou Leon Guerrero is pushing to get federal funding for a study that would look at developing an aquaculture industry on Guam. Courtesy Of University Of Guam

Governor: With bacteria-free farmed shrimp, Guam could be aquaculture capital of Pacific

Haidee Eugenio Gilbert Pacific Daily News

Published 9:01 p.m. ChT Apr. 30, 2019 | Updated 9:04 p.m. ChT Apr. 30, 2019

Farming bacteria-free shrimp may just be Guam's ticket to becoming the aquaculture capital of the Pacific, which could rake in billions of dollars in annual revenue in this side of the world, Gov. Lou Leon Guerrero said.

With Guam importing some $10 million worth of seafood products annually, aquaculture is also one place the island can turn to for local food security.

The governor on Tuesday signed an executive order creating the Guam Aquaculture Task Force, which will reinvigorate efforts to develop an aquaculture industry starting with shrimp farming.

"We're possibly looking at a $7 billion industry," she said.

Timeline / Next Steps

October 12, 2020 Meeting Notes

Guam Coastal Management Program (GCMP)
Section 309 Assessments & Strategies Update Stakeholder Meeting

Monday, October 12 2020 - Virtual Conference via Google Meet
https://meet.google.com/kxi-txcs-fgg
(US) +1 715-600-0161 PIN: 172 585 200#

Agenda

9:00am – 9:05am	Welcome remarks by GCMP
9:05am – 9:10am	Google Meet Housekeeping
9:10am – 9:20am	309 Update Process (survey results and prioritization)
9:20am – 9:30am	Enhancement Area 1 – Wetlands
9:30am – 9:40am	Enhancement Area 2 – Coastal Hazards
9:40am – 9:50am	Enhancement Area 3–Public Access
9:50am – 10:00am	Enhancement Area 4 – Marine Debris
10:00am – 10:10am	Enhancement Area 5 – Cumulative & Secondary Impacts
10:10am – 10:20am	Enhancement Area 6– Special Area Management Planning
10:20am – 10:30am	Enhancement Area 7–Ocean Resources
10:30am – 10:40am	Enhancement Area 8–Energy & Government Facility Siting
10:40am – 10:50am	Enhancement Area 9 –Aquaculture
10:50am – 11:00am	Q & A (Review questions from Google Meet chat)
11:00 am – 11:15 am	Discussion and Recommendations
11:15 am – 11:30am	Next steps and Adjournment

Page 1 of 13

Oct. 12, 2020 Meeting Notes

BSP-GCMP Administrator Edwin Reyes provided introductory remarks outlining the 309 assessment and planning process and thanking the partners for their time and support.

Blue Solutions provided an overview of the stakeholder survey results that were collected between July and October, 2020, reporting that three of the nine enhancement areas – coastal hazards, cumulative and secondary impacts, and special area management planning – had been ranked as "high priorities" based on survey feedback and follow-up discussions with GCMP.

Overviews of enhancement area updates were provided, with data gaps and planning questions highlighted.

Proposed enhancement rankings were discussed as follows:

Enhancement Category	2015 Rating	Proposed 2020 Rating
Wetlands	Medium	Medium
Coastal Hazards	Medium	High
Public Access	High	Medium
Marine Debris	Low	Medium
Cumulative & Secondary Impacts	High	High
Special Area Management Plans	High	High
Ocean Resource	Medium	Medium
Energy & Government Facility Siting	Low	Medium
Aquaculture	Low	Medium

Stakeholders are encouraged to provide any additional comments regarding management priorities and recommendations to support effective management of the enhancement areas detailed in the assessment and strategy report. This five-year strategy aims to support Guam's coastal management program goals, and YOUR FEEDBACK will help support the development of targeted strategies that enable critical program changes for these enhancement areas over the next five-year planning cycle.

Blue Solutions provided an overview of the project timeline, which has been compressed due to challenges in holding a meeting with GovGuam partners during the COVID-19 shutdown. *Again, many thanks to all that attended today's meeting!*

Comments and additional feedback are requested by October 21, 2020, so we can include your updates into the draft 309 Assessment and Strategy Report.

The list of attendees will receive a notification when the 30-day public notice for the draft is published and we encourage you to review the Phase I and Phase II assessments that pertain to your areas of interest and expertise and provide further comments if you have relevant information or additional feedback to share.

After providing a brief overview of the current state of Phase I and initial Phase II assessment data and trends analysis, a summary of next steps in strategy development was shared. The 309 planning update component focuses on "program changes" that aim to support shared management objectives, including the creation of proposed work plans, milestones, and next steps to achieve them based on the feedback that stakeholders provide and priorities selected by the GCMP with support from NOAA-OCM. Stakeholder are encouraged to share recommendations and comments that highlight opportunities for further collaboration and alignment with existing management planning efforts with identified GCMP priorities through this planning process.

The project team opened the floor for the question and answer session where participants were encouraged to share feedback.

Questions and comments from the virtual meeting chat as well as discussion are captured here. *These notes are in draft form and will be included for reference in the 309 report. Please advise if you would like to request any revisions before October 21, 2020 so we can include your edits in the revised final document.*

Question: BSP has done a lot of workshops on "Low Impact Development" (LID) – is that something you plan on working on as a policy? It would be very helpful. There is so much known about it but little implemented, especially with the increase in "gray" areas.

Response: LID has been discussed a fair amount in the Cumulative and Secondary Impacts (CSI) section in terms of past reports and efforts to identify, visualize, and quantify those impacts, and including this in potentially enforceable policies seems like it would align with 309 opportunities to support program change(s) to enable BSP-GCMP to be more engaged in at least development review at sites that have been identified as being "sensitive" for various reasons such as steep slopes, location in a watershed that already has over 15% impervious cover. There could be some policy recommendations that come out of existing water quality data and reports that could be incorporated into tools as well as Special Area Management Plans. That has come up in comments and we will include it as a suggesting in the notes that this might be an area that could be looked into further for strategy development. Thank you for that question and comment.

Comment: Please make sure that you do your (NHPA) Section 106 ahead of time.

Response: Thank you for that Guam Historic Preservation Office, and well noted. Presenter requested clarification as to whether Section 106 of the National Historic Preservation Act of 1966 (NHPA) was required for planning efforts or development specifically, and GHPO responded that it is recommended that Section 106 would be conducted in the planning stage "which will allow you to possibly avoid any adverse effects to historic properties" and noted that the "State Historic Preservation Office is hoping to get out Guidelines by the first of the year" to further support this project scoping and regulatory compliance process.

Note: If there are questions the project team is not currently able to answer we will circle back with you on that. Our project team was not clear whether NHPA applied to planning efforts, but because Section 106 is a requirement for federal agencies and federally funded projects, activities, or programs, GCMP and the project team will revisit this comment for further discussion with NOAA-OCM on the project call later in the week. Thank you for flagging that!

Well noted that projects with federal funding would go through the Section 106 process and thanks also to your contributions to the Guam Development Guidebook update, certainly federal partners and funding streams that require Section 106 review.

Question: Also wondering about terrestrial endangered species – since we have tree snails that are commonly found in coastal habitats and a few trees as well such as *Heritiera (Heritiera longipetiolata)* or the *Cycas micronesica or* fadang (Chamorro name) will there be regulations for those included? And secondly, the UOG Center for Island Sustainability is also working on a Habitat Conservation Plan that was just awarded to the Department of Agriculture that UOG will be helping with – is that something that could be included?

Response: We can certainly include that discussion in the Special Area Management Planning – project team will follow up to request details on habitat conservation plan and the timeline as it would be great to be able to mention that. Where there is an overlap between endangered species habitat and existing special management areas and when you create that new habitat conservation plan it seems that would be something that could be incorporated through codification efforts as well – that would be question for BSP-GCMP as to what extent if any would habitat conservation planning be included potentially as a conservation planning element (in the Comprehensive Development Plan or updates).

Question: Administrator Reyes noted regarding CSI and the earlier comment about promoting low impact development, and acknowledging that we have some architects and engineers on the call, it would be helpful to know from stakeholders on the call if the building code update has already taken place and how BSP can contribute to that process?

Response: Building Code Council Member Brent Wiese responded that Guam Building Code workshops will start soon – they have been waiting to be able to meet. The goal of the workshops will be to review possible code revisions. The Guam Tropical Energy Code was introduced to the Legislature for approval recently.

Question: When is the Habitat Conservation Plan expected to be finalized?

Response: It was just selected for funding and still has to start with the first phase starting in November. It is envisioned as a two-year effort at first and will be updated as it moves forward. Guam Department of Agriculture Director Chelsea Muna-Brecht explained that the first phase is a two-year assessment that supports information

collection and a draft of the Habitat Conservation Plan, and then that will be followed by a second grant to finalize and produce the document, so we are looking at anywhere between three to four years for a final product.

Question: Is that being done in alignment with the Forest Conservation Plan that is also in development?

Response: It is separate from the Forest Action Plan but the intent of both documents will be aligned.

Note: 309 project team notes that it would be fabulous to include this in the SAMP update so we will work to capture this update in the notes and will work on including a summary based on the information you shared to make sure we captured that information correctly; we may reach out for additional details if needed.

Comment: Administrator Reyes asks regarding the Forest Action Plan (FAP) brought up by the Department of Agriculture (DoAg) – notes that the FAP is meant more for the federal funding side while the plan currently being mentioned in the draft SAMP section is the Guam Forest System Plan under the Forest Legacy Act, so that is more of a creature of statute that has a different authoritative feature once that plan is adopted so was hoping we could talk about the difference between the Habitat Conservation Plan that is coming and the statutorily authorized Forest System Plan under the Legacy Act.

Response: Division of Forestry representative clarified that the Guam Forest Action will be finalized by the of 2020. Foresters are scheduling virtual meetings with their stakeholder groups for final feedback. We want to keep moving on the Legacy Plan.

DoAg representative thanks Administrator Reyes for clarifying that and agrees these are two very different documents and processes. With the Forest System Plan that DoAg has been working on with BSP-GCMP, that would designate conservation areas within the Government of Guam properties or footprints, conservation areas specific to restoration activities, recreational activities, and such. The Habitat Conservation Plan has to do with federal requirements and permitting processes to make sure that we are maintaining habitat for endangered and listed species. So, there is alignment on both plans in that the Forest System Legacy Plan can also have designated areas that are set aside for the relocation of endangered or threatened species that may be found on private property or government properties in the process of construction or development. Right now we have no process in place to relocate threatened or endangered species so typically projects come to a halt for upwards of a year sometimes until that private entity or government entity can establish a habitat conservation plan with U.S. Fish and Wildlife Service. Once we have this Habitat Conservation Plan for the entire island of Guam then the authority will fall on the DoAG to establish a permitting process for that and have locations identified where species can be relocated to. Right now when a species is found we can't touch it – no one is authorized to touch it. But with the Habitat Conservation Plan that would change and expedite the process.

Comment: FAP is the guiding document for where we want to go with future funding and project goals, and overarching goals and strategies.

Response: So that has your strategic planning elements more broadly in it and then the Habitat Conservation Plan is really focused on your endangered ESA-listed species. Thank you for the clarification!

Comment: Right. In addition to the FAP, embedded in that are "Forest Stewardship Priority Areas" so we are working with UoG and DoAg fire mapper to create new updated maps for the FAP. Once there is a more refined version of those maps they can be shared and include, especially those stewardship sites, those will be really helpful to include because many of these sites are prioritized because they are already buffering current management areas or expand the ability to buffer those sites. That can expand our green spaces and potential areas to protect.

Note: Updated documentation will include this information on FAP, Stewardship Priority Areas, Habitat Conservation Plan, and highlight opportunities for expanded protection of existing and future management areas through application of buffers, thank you.

Response: Absolutely. That brings us back to the definition of "coastal hazards" as it is framed in the 309 Assessment. This is a definition that previously was focused on flood hazards, which are certainly important, however, as mentioned as we receive new information about fire frequency and extent there do seem to be some indications that those are both increasing with some of the change that we're experiencing, so trying to identify and include other natural disasters or natural hazards that may warrant further discussion in the Coastal Hazards section might be prudent. Does this group want to weigh in on whether high hazard areas should only be defined as flood zones or do you want to consider a more robust definition based on the fact that the entirety of the island is a coastal zone and there are many coastal hazards that you stakeholders are gathering great information on in order to manage more effectively.

Comment: NOAA SLOSH (Sea Lake and Overland Surge from Hurricanes) model for Guam is expected to be released later this year; preliminary Maximum Envelope of Water (MEOWs) might be available now. There is also a one-dimensional wave run-up model for Coastal Hazards – see Storlazzi 2019. New Lidar and topobathy map being requisitioned by NRCS and is scheduled to be released by the end of 2020.

Note: Thank you for this information – we will include it in the report and follow up with you and/or OCM on data availability. It is great to capture these updates to support discussion of next steps further!

Response: Great, thank you! That is new data that we can flag as an update and we will include it in the report in both the Coastal Hazards and the SAMP sections. The CREST (Coastal Resilience Environmental Siting Tool) data may also inform some future

scoping conversations as well. That tool will be including a lot of the data updates that people are already referencing, so it is great to hear that you will be getting the revised fire impact areas and projections from that. As you carve out these areas for environmental species and habitat conservation considerations, if you have an idea of what those areas are looking like now we can certainly call them out in the discussion of the Special Area Management Plans as well in the 309 assessment report because fragile areas, fragile habitats, including wildlife habitat were called out in that document. We'd love additional detail on the geographic extent. For GHPO's reference, ancestral lands, cultural and historic sites, and Chamorro Land Trust lands are also identified as fragile areas and existing special management areas in the 309 assessment report that warrant further consideration and coordination.

Comment: Off topic, but if anyone knows of any families that lived up by where the new waste water treatment plant is in the 1940-50s please send them my way. We had a new graveyard that has never been documented. Thank you, John Mark.

Note: Thank you and noted.

Response: If we get questions we don't have an answer to we will include them in the meeting minutes and try to get you connected with people that can respond.

Question: I am the new NOAA Coastal Management Fellow working with BSP and GCMP to develop the Seashore Reserve Plan. I am still very new to everything Guam and want to know if there has been any talk regarding policy change and the incorporation of a tourism and conservation levy/tax on international visitors entering the country. This tax would be used to support sustainable tourism and conservation projects for example. If not, I'd be interested to know stakeholder thoughts.

Response: This has been a subject of some contention for a while here in CNMI – we looked into doing a visitor arrival tax and it wasn't something that we could establish at the airport because of FAA restrictions but we do have taxes that are levied from hotel occupancy and I believe there is a similar program on Guam but would need to verify.

Responses from Stakeholders in Chat: Referencing green fees? That's been a topic for years. Guam has the same FAA restrictions, yes, and there is an 11% Hotel Occupancy Tax but that does to the general TAF and not specific to conservation.

Question: Regarding next steps, to circle back to the question that Administrator Reyes asked, if there are opportunities to for example support building code implementation specific to some of these identified coastal hazard areas, that's an area of emphasis the 309 program has been used for in the past and it might be worth asking the developers and the folks involved in building on the call today regarding how desirable such support might be and if you have an idea about how timely that might be. It is exciting to hear that the Tropical Energy Code is moving forward and that might have some potential for implementation support through other programs as well. Brent Wiese mentioned that there has been no discussion on additional building codes for coastal areas at least

from the building code council but they welcome the input. Guam building code workshops are starting soon and the goal is to review possible revisions. GCMP and Dept. of Land Management (DLM) should be included. For example FEMA and the RiskMAP process that will be underway in the next few years.

Response: At this point there has been no discussion of adding building codes for coastal areas. Agency partners including GCMP can be looped into that planning process when stakeholder meetings are scheduled and move forward.

Note: Great – this is an approach other jurisdiction have taken to address special vulnerabilities of certain areas. Acknowledged these discussions are ongoing and some needs and next steps have been identified but as of yet there are no timelines or next steps identified. Comment in chat that DLM would also like to join Building Code stakeholder meetings when they are scheduled.

Question: When discussing coastal hazards would this group be inclined to frame that conversation in a way that expands beyond run-up but looks at other threats to life and property including development and redevelopment of high hazard areas? Would anyone be strongly opposed? Hearing no stakeholder response, we will circle back with the GCMP on that question.

Other areas we had flagged here are regarding updates to management areas, things your studying that relate to data, plans, and enhancement area management efforts and trends that we could include in the relevant sections of the report. If you have a recent report that may be relevant to any of these nine enhancement areas that we didn't mention if you could please send it our way it would be greatly appreciated. This will enable us to highlight the new information that is available as well as the great work that you and your teams have done to get that together and highlight any potential planning efforts that might be coming out of that. We would welcome further comments on geographic extent of some of these hazards and impacts as well.

Comment: Administrator Reyes recognizes comment in the chat and notes that it is important for that project that as we develop strategies that may have implications on the building code that those be brought up to the Building Code Council and include them in the process.

Response: Absolutely and noted thank you. If Building Code issues are identified, loop in Building Council. And that could be relevant to some of the discussion of Coastal Hazards and Cumulative and Secondary Impacts as well. In fact, when we share out that section it would be great if members from the Building Council could take a look and perhaps provide additional comments especially if they have more current information regarding housing trends and the number of buildings constructed before 2000 as those are data points in the report and it would be great to get some additional feedback.

Note: Chairman of the Guam Building Code Council, Brent Wiese, commented that project team could feel free to reach out – well noted with thanks!

Comment: There are some exiting implications of all of this geospatial data becoming available. For the Forest Action Planning and fire assessment data is that going to be geospatially visualized as well?

Response: Yes - the Interactive Fire Mapping Tool for maps of wildfire sites from 2015-present is available here.

Comment: Aquaculture is increasing.

Response: Yes thank you. If there are updates anyone can share on the Aquaculture Taskforce planning effort and timeline, that would also be very helpful.

Response: The Aquaculture Taskforce was established by Governor and is looking at backyard subsistence level visual promotion for aquaculture. This is not going to be a money-making venture but has an educational focus, with little to no impact on the environment. Also, former commercial aquaculture producers with land-based ponds, many of whom have gone out of business or are idle at the moment, they are regrouping and looking to develop an aquaculture producers group so they will be a major stakeholder and can provide a lot of input in terms of aquaculture development. There has been no Aquaculture plan revision since 2010 so that needs to be updated, and the Aquaculture Taskforce may address that as well. There is also, looking into the future, interest in the ocean cage culture, it is developing technology. There are ocean cage farms in Hawaii, down in the Gulf, on the East and West coasts, so that's something that is being looked at pretty intensively. We're looking for some funding to take a further look at the evaluation process, suitability analysis, and capability analysis, and all of that would probably take two years if it is funded, and then we can look towards a possible demonstration facility with some education and training. We're hoping that the former UoG hatchery facility that is now leased to a private company can also support in providing some training in the area of shrimp culture and water chemistry and those basic things to develop a labor pool of skilled workers. So that is all ongoing and aquaculture planning has been a pretty intensive drive on all fronts. There is a Hawaii Aquaculture Consortium that I (our reporting stakeholder, a representative of UoG Sea Grant) sit in on and they have NOAA representatives as well as University of Hawaii and Hawaii Sea Grant representatives as well so there has been a lot of information circulating from all angles. Tori Spence(-McConnell) is the NOAA representative from Hawaii that is very involved in this process and she has been providing a lot of really valuable information on Hawaii's development and the federal rules and regulations that may apply and some direction. So, our initial step would be looking at any local legislation or rules and regulations that exist or that need to be developed to cover ocean lease in territorial waters and then as we get out further the federal laws will apply. But that's a long process that will take a lot of time and a lot of focus over the next 3-5 years.

Response: Thank you. That is a really helpful update and a great planning horizon in that 3-5 year timeline that we can certainly capture and work on making sure that it is reflected in the Phase I write-up for aquaculture, which appears is appropriately being bumped up on everybody's radar for many reasons including being able to support many of these beneficial uses of the ocean and coastal resources. Fabulous update, exciting to hear, and thank you for sharing!

Question: In terms of priorities, is there general consensus that decision support tools, additional capacity building, perhaps some combined data and information sharing and management systems would support both the achievement of the enhancement priorities that we've talked about today as well as some of your areas of management? Are there things that we're missing that would really help bring all of these elements together that you'd like to share out on?

Hearing no responses, are there any concerns about increasing the ranking of coastal hazards from medium to high to reflect the stakeholder feedback that's been received and to expand the definition of coastal hazards to potentially include those identified in the Guam Hazard Mitigation Plan? *No concerns identified.*

Going through the enhancement areas and the questions we've flagged in hopes that our subject matter experts can chime in, is anyone doing anything specific to wetlands or wetland conservation planning that we may have missed?

Response: DoAg and BSP submitted a grant proposal that is currently being reviewed for restoration and conservation in Asigua Highlands (Lonfit River and Pago River). The site targeted is the largest wetland in that area, spanning about 19 acres, and the rivers combine and drain into the Pago Bay estuary. It isn't funded yet but that is a proposal to fund work in that area. And it should be reviewed in the next month or so, so we'll know shortly whether that's approved.

Note: Yes, we can at least mention these efforts in the wetlands management Phase I discussion – it is perhaps not a significant change in the management category but there is a prioritization and focus on that area and planning efforts are underway. Thank you for adding that.

Response: The 2020-2022 NOAA CRCP Coral Fellow is focused on mangroves and seagrasses.

Note: Great, we can certainly pull out highlights of that project as well.

Comment: Great, thanks. It looks like we have pretty comprehensive coverage of Wetlands, Coastal Hazards, Public Access. We didn't hear any disagreement about any of those revised data points or management prioritizations. Regarding Marine Debris, people are on board with a medium level prioritization, slightly elevated due to increasing beach / shore litter, land-based dumping, storm drains and runoff, as well as increasing the level of derelict vessels and their impacts to "medium"? And we will

include some reports on the interagency efforts for marine debris control at Cocos Islands as well as the ongoing International Coastal Cleanup efforts there.

Comment: Will the Ports Authority be able to provide context for the rules and regulations around public access to areas such as Family Beach> If so, what forum or method should be used?

Note: Sorry to have missed this question in the chat. Yes, Ports Authority will be included in stakeholder outreach efforts regarding the Public Access Plan. If you would like to provide feedback in advance or discuss this further please contact Esther Taitague at esther.taitague@bsp.guam.gov

Comment: There is so much we could get into more on Cumulative and Secondary Impacts. If you or your agencies or affiliations have any supporting information you'd like to share to have included in this report – for example changes in housing trends, changes in some of the flooding patterns which we do have some pretty good data points on, but if you have any reports regarding environmental effects of these flood events we'd love to include the best available data that we can so please send it our way. That being said we do have a lot of information from the Army Corps / BSP reports as well as some past water quality trend data from Guam EPA in that section.

Response: We did a Social Vulnerability Index (SDI) with sea level rise scenarios and vulnerability modeling for Guam here.

Response: Thank you for your presentation. Will submit supporting information and feedback if any by noted deadlines.

Comment: Thanks again to everyone for your feedback and support and if anything if you are digging into these responses and you have an "Ah-ha" moment where you come across a management opportunity that you'd really like to see included or a major issue or challenge to achieving these enhancement objectives that wasn't well captured, we're really hoping you can provide us some feedback from your areas of expertise to make sure that this report is providing as comprehensive of a snapshot of the current state of these nine enhancement areas and a tool that can help identify next steps in terms of management planning and priorities for the 5-year Section 309 program.

It does sound like we have an opportunity to circle back on some of the special area management planning that's going on specific for the habitat conservation planning for the endangered species so we'll try to make sure the geographic areas are reflective of those efforts in the report.

Question: For Energy and Government Facility Siting there is a focus on energy related activities which may be of "greater than local significance" but because of the focus on government facilities is there interest in including the solid waste management efforts that are currently underway such as the Zero Waste initiatives and studies?

Note: No response from Stakeholders, does relate to some of the Marine Debris and CSI too, and it would be great to be able to highlight these efforts and the related goals including the Guam Green Growth initiative, so will check in with BSP-GCMP on that.

Question: Isn't Guam Power Authority building a new power plant by MicroMall? I didn't see that in your last slide.

Response: Yes, Edwin (GCMP) representative confirms that a LNG facility has been proposed. Brian from Guam EPA mentioned that the new power plant is currently proposed for diesel but could be converted to LNG in the future, plus there will be a new diesel and LNG pipeline from Seaport to the new site.

Question: Thank you for catching that – can anyone confirm if this is the same facility that has been proposed since the 2010-2015 report? No further response on this so will follow up with BSP and GPA as needed to confirm.

Comment: There has certainly been a lot of action in the energy and government facility area, especially depending on how you are defining government facilities. Certainly, there has been an uptick in the energy realm, including increasing deployment of solar power with up to 66MWh deployment reported, or 4% of the energy portfolio in 2018. The focus on renewable energy deployment is supporting progress towards Guam's renewable energy goals (20% by the end of the decade) which we will include in the write-up as well.

Question: Any other recommendations or questions from the stakeholders today? Any background information you'd like more detail on?

Hearing none, the important next steps in this process will be that we will share back these notes to once again request your feedback and confirm there isn't anything we missed or that you'd like to see detailed further.

Your feedback by COB 10/21 would be ideal but if it is something you'd rather talk about and you would like to schedule a meeting please let us know and we will try to get that calendared in the next week so we can get all of the feedback that you can share with the goal of supporting the finalization of that 309 Assessment Strategy and Report, Phase I and II draft. When the draft is published that will be a one-month notice and comment period and all of the information you're sharing today and through that process is going to be incorporated into the assessment and strategies. We really appreciate your time and feedback on these very important coastal resource enhancement areas.

That concludes our meeting for today – we will share the PDF and please provide any additional feedback that would help in this process. Our contact information is at the end of the slide deck (also included here for your reference). Even if it isn't a finalized plan or project if it is something you or your agency or institution are working on that is

relevant please feel free to share! If it is revenant we will include and if it isn't but might be in the future we can pass it back to GCMP to include in future updates.

Thanks again!

Appendix II – Public Comments

Public comments received on the Draft 309 Assessment and Strategy Report, published for a 30-day notice and comment period on _____, will be included here in the final report publication.

As OCM guidance instructs, general public participation in the assessment and strategy process can take many forms. At a minimum, the public must have an opportunity to review and comment on the document. CMPs should provide adequate public notice, make the assessment and strategy document publicly available, and ensure that a minimum 30-day public comment period is provided. CMPs may hold the public review period concurrently with OCM's review of the draft submission. The public review process does not require formal public hearings and may occur in many ways, including public comment websites, advisory committees, commission meetings, or informal public workshops. CMPs are encouraged to publish the document online for public comments.

A brief summary of all relevant public comments will be included with the final assessment and strategy.